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SUGAR BEET

BULLETIN

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Vol. 30 1966

THIS FILE FOLDER accompanies the year's first issue of the Spreckels Sugar Beet Bulletin.

We hope that you will save this folder, so that future issues may be filed for reference.

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PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

SPRECKELS SUGAR BEET BULLETIN

VOL. 30 SPRING, 1966 NO. 1



SPRINGTIME IN THE BEET FIELD

Means more machinery and less labor than ever before. Today's sugar beet grower will space-plant his seed, thin his seedlings by machine, and make use of every effective chemical aid to weed and pest control.

THIS ISSUE of Spreckels Sugar Beet Bulletin initiates a new schedule of release dates. Instead of appearing on alternate months (6 issues per year), the Bulletin will appear as a quarterly in March, June, September and December. These issues will be designated Spring, Summer, Fall and Winter.

This new schedule will in no way change the content of the Bulletin. Each quarterly issue will have 12 pages, so that the annual volume will continue to have 48 pages.

FUTURE FARM LABOR REQUIREMENTS AND MECHANIZATION OF SUGAR BEETS

By JAMES HOUSEBERG, Assistant Manager
Grower-Shipper Vegetable Association, Salinas

THE FRESH VEGETABLE industry of our country, particularly in the Central California Coastal Counties, is undergoing almost limitless changes. History is in the making. Though many agriculturists do not readily associate the growing of sugar beets with the production of other fresh vegetable commodities, beets still are what is referred to as a "row crop", and these all require similar cultural practices including good land and bed preparation, planned planting of the best seed available, thinning of the plants, hoeing the weeds and then in due course of time harvesting the crop — weather and a multitude of other extenuating circumstances permitting.

Each of these activities have always required large numbers of workers, because most of the work was necessarily done by hand. In this regard, relatively good field laborers were available in quantity up to the few years immediately preceding World War II. The supply of manpower then available to agriculture dwindled and continued downward, understandably so throughout the war years. It was this lack of manpower that provided the necessary impetus to researchers, machinery developers and manufacturers to further refine earlier developed beet topping and harvesting machinery.* They offered sufficiently field-worthy new equipment to enable both topping and harvesting operations to be accomplished 100% mechanically. There the work stopped. It was still necessary to use large numbers of field hands to do all of the thinning and weeding. How many? Although the exact number could only at best be an inaccurate estimate, we do know from the State Department of Employment statistics that 17,750 seasonal domestics were employed to thin and hoe Monterey County's 24,371 acres of sugar beets in 1965. That is a tremendous labor requirement, which necessarily varies year by year dependent upon the acreage planted. In this regard, it may be of interest that in the no-allotment year of 1964, Monterey County growers harvested almost 32,000 acres of sugar beets.

* (For details and addresses of manufacturers or distributors of thinning equipment, contact either your Spreckels agricultural district manager, or the author.)

SUGAR BEETS IN MONTEREY COUNTY

This same county, about 25 years ago, was the number one producer of sugar beets, whereas, today it is number five, Imperial County having moved into the number one position followed by Yolo, San Joaquin, and Fresno Counties. Each of them is among the largest users of field labor, the availability of which today is agriculture's primary problem.

By using another set of data, we can arrive at a fairly accurate figure as to the total man-days required of Monterey County's beet crop labor force. Giving or taking a little for any individual operation, the average reported time required — by the quality of labor which was available last season — was about 25 man hours per acre to do the thinning and about 8 man hours per acre for hoeing. This is a total of 33 man hours per acre. Assuming an 8 hour day, we cannot but conclude that we needed 4⅛ man days per acre or a total of 99,120 man days to perform just the thinning and hoeing.

Let's broaden the base just a little. Looking ahead to the 1966 season, and to the 321,945 acre beet allocation for the State, we can calculate the need of a California beet thinning and hoeing labor force equal to 1,329,632 man days.

It does none of us any good to look back to the days when a good field worker thinned an acre of beets in one day. Those days are gone forever, and we in agriculture had better recognize it as fact and be guided accordingly.

We might make one more rather interesting projection of our figures. The total U.S. sugar beet allocation for 1966 is 1,435,000 acres. By making use of the same 4.13 multiple, we can fairly accurately predict the need of almost 6 million man days of field labor, again just for thinning and hoeing our nation's sugar beet acreage. Where can we get this amount of labor?

THE 1966 LABOR FORECAST

The batter really gets thick when we realize that no foreign supplemental work force was authorized for California beet growers in 1965 and further, that none can be forseen for 1966.

Factually only 18,400 Mexican Braceros were authorized in 1965; about 17,000 were cleared and employed, and nearly all of them for tomato harvesting. We must realize that none are predicted for any crop during 1966 except under the most critical of all emergencies. Secretary of Labor Wil-



lard Wirtz has told us this, as has the Chairman of his California Agriculture Labor panel, Professor Benjamin Aaron, and also Mr. Al Tieburg, Director of our State Department of Employment, and many others in high governmental positions.

This means very fundamentally that all high labor sensitive crops, (specifically including citrus, lettuce, strawberries, asparagus, melons, tomatoes and Brussels sprouts) will be competing for the services of the same 17,750 workers who worked only in Monterey County's sugar beets last season. To make matters even worse for 1966, the sugar beet plantings in our county have been delayed due to adverse weather conditions. Indications are therefore apparent that all commodity plantings will be made at about the same time, and all will require thinning and hoeing at the same time in the weeks not too far distant. This is to say nothing of the peak load months of May, June, September, and October.

Even though it is predicted that Monterey County's beet plantings will be reduced to 18,000 acres this season — due to last season's low prices, low yields and increased costs of operation — the squeeze for willing, able and qualified field labor is expected to be more severe than it has been in any past year.

There are several solutions to this problem, but to me the most logical, except for a change in administration, is for the sugar beet grower to consider what equipment is presently available to him and plan his program around the thought of not putting any men into the field. At least two growers did this successfully last season without any appreciable loss in tonnage, and I have no doubts that they will repeat last season's practice and probably on a far greater base. The balance of the growers struggled with the labor situation. I feel that an honest evaluation of last year's labor costs for hoeing and thinning beets will show at least an average of between $30.00 to $35.00 per acre, although we know of a few cases where it actually ran as high as $70.00 to $80.00 an acre. This represents a very substantial amount of money by way of working capital which could be considered as available for investment in machinery.

I also feel confident in stating that the large majority of growers would prefer to wait out a short period of equipment down-time to the possibility of not being able to recruit the required number of men to get his work needs satisfied.

Perhaps I have taken too sober a view of our labor problems, but I for one wouldn't want to be the ostrich ready to loose his tail feathers. Particularly when there are quite a few advantages working in the beet growers favor to assist him should he decide to mechanize. Let's take a look at some of the more important factors:

1. All beet seed is now either monogerm or processed multigerm.

2. Spaced-seed or precision planters are available.

3. A limited number of doubles (up to 25%) can be tolerated.

4. Selective weed control herbicides including Endothal, Pyramin, and Tillam are providing effective weed control in many areas. Ro-neet and TOK-25, though not yet registered, look encouraging.

5. Many mechanical blockers, weeders and thinners are now available which produce stands comparable with today's unskilled hand thinning.

6. Several electronic individual plant selector thinning machines are being rushed through their final stages of development and field trials. The first of these machines should be available in limited quantities by early spring.

STEPS TO SUCCESSFUL MECHANIZATION

I would be remiss if I did not include a word of caution about a decision to mechanize. The Engineers, in their design of equipment, have frustrating limitations. They want to help us, and they will. However, the efficiency of the equipment they offer will bear directly upon the grower's willingness to amend his cultural practices, and above all, to patiently supervise the adjustment and operation of his equipment.

His thinking should include at least the following:

1. Incorporate better soil and bed preparation practices.

2. Make use of anticrustant or soil amendment materials in fields having a history of need.

3. Undertake an intensive herbicide program, utilizing the best materials presently available.

4. Undertake an equally intensive insecticide program.

5. Consider a systems approach whenever possible, so that each piece of equipment will compliment another.

If you are a typical grower you are still caught in a cost price squeeze. History is in the making. Why not join in its making? Mechanize.

A.S.S.B.T. MEETING ATTENDED BY SPRECKELS TECHNICAL STAFF

THE AMERICAN SOCIETY of Sugar Beet Technologists convened at Minneapolis, February 21-24 for its Fourteenth General Meeting. Two General Sessions were held, and simultaneous section meetings covered the subjects of Agronomy, Genetics, Entomology, Agricultural Engineering, Chemistry, Physiology and Factory Operations.

Fifteen Spreckels technical specialists participated in the presentation of papers, panel discussions and as section chairmen. Those attending were:

Austin Armer, Ernest Beck, Jr., Walter Bernhardt, Oren Bonney, Lauren Burtch, Fred Eis, H. E. Halden, R. E. Hallbeck, Ernest Hartmann, Dr. Varon Jensen, Dr. Russell T. Johnson, Dr. R. A. McGinnis, Dr. James Schulke, Dr. Murray Sibley, and George Wheatley.



SPRECKELS AGRICULTURAL STAFF ATTENDS ANNUAL MEETING IN MONTEREY

ONCE A YEAR the entire staff of the Spreckels Agricultural Department gathers for a 3-day conference to exchange information and to re-orient viewpoints and policies with regard to the growers they serve and the Company whose sugar beet supply is their responsibility.

The 1966 meeting was held at Monterey. The first afternoon session was devoted to presentations by specialists from agencies other than Spreckels Sugar Company. These included:

Prof. Coby Lorenzen, Chairman Agricultural Engineering Dept., U. of C., Davis.

Dave Scott, Technical Director, Soil Serv. Inc.

McKay McKinnon, District Director, U.S. Food and Drug Administration.

Dr. John Phillips, Director Hopkins Marine Station, Stanford University.

One entire day was devoted to presentations by Agricultural Staff members, mainly in the form of panels wherein several specialists participated.

Field trips were made to the Salinas Valley to view the seed breeding and processing program of the Company.

Executives from the Operating, Sales and Accounting Departments presented a series of talks on the interrelation of these departments with the Agricultural Department.



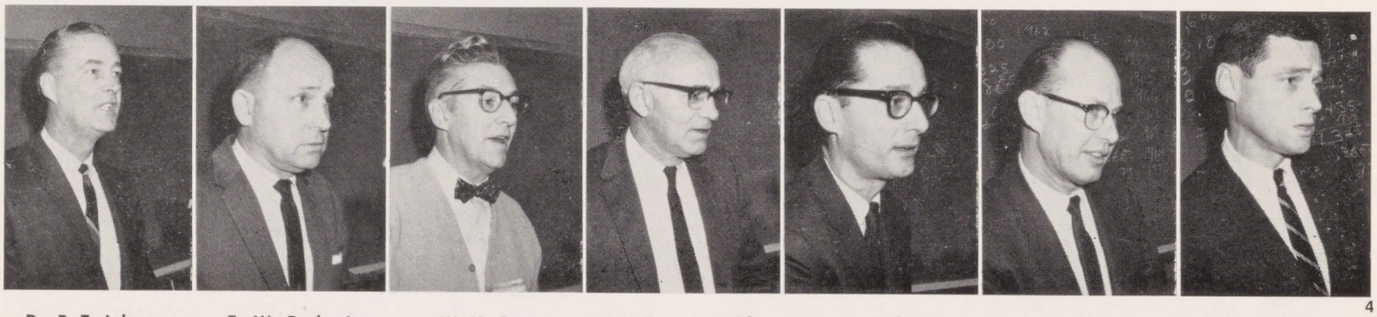
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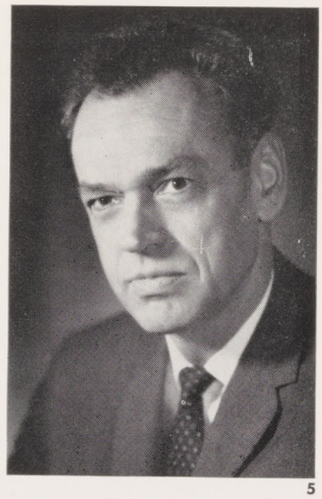
Dr. R. T. Johnson, V.P., Agriculture | E. W. Beck, Jr., V.P., Operations | W. H. Ottey, V.P., Sales | R. Traves Smith, Treasurer | L. J. Melancon, Comptroller | D. M. Swartz, Statistician | R. O. Nagle, Gen. Counsel

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GUY MANUEL ELECTED VICE PRESIDENT OF AMERICAN SUGAR COMPANY

GUY D. MANUEL, 48, president of the Spreckels Sugar Company, San Francisco, was elected vice president of American Sugar Company on January 25. Mr. Manuel will continue as president of Spreckels Sugar Company with headquarters at 2 Pine Street in San Francisco, his position since 1962.

Mr. Manuel joined the staff of Spreckels after graduating from the University of California, Berkeley, in 1939, where he received a B.S. degree in Agricultural Economics, and spent an additional six months as a fellow of the Giannini Foundation of Agricultural Economics.



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He was an agricultural field superintendent for Spreckels for five years, and was promoted successively to agricultural superintendent and assistant district manager. He was put in charge of all the company's agricultural activities in 1949.

Mr. Manuel is a member of the Statewide Agricultural Committee of the California State Chamber of Commerce and of the American Society of Sugar Beet Technologists; a former member of the Agricultural Advisory Council of the University of California and a former director and president of the Beet Sugar Development Foundation and of the West Coast Beet Seed Company.

A native of Vacaville, California, he now lives in San Anselmo with his wife, Janet, and three children.

NEW RESEARCH FACILITY COMPLETED

RESEARCH IN THE CHEMISTRY of sugar beets and beet sugar production has been centered at the Woodland factory since 1939. Little by little the space devoted to research has grown, and now a separate building has been completed to accommodate the needed laboratories and offices.



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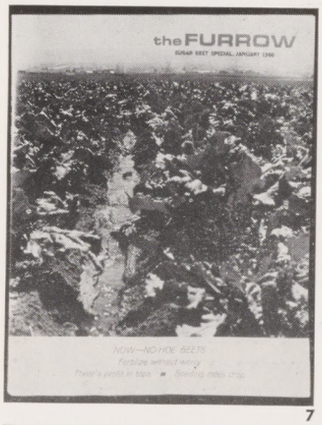
THE NEW Research building at factory 3, Woodland.

The new research facility houses the chemical research staff headed by Fred Eis, and provides a broadened base for cooperative investigations in sugar beet physiology and chemistry. Toward this end, Dr. Varon Jensen, plant physiologist, has moved from Spreckels to Woodland. Here he will continue investigations in sugar beet physiology, as well as overseeing the agronomic program formerly headed by Jack Brickey, who continues as agronomist in Arizona.

JOHN DEERE "FURROW" FEATURES SUGAR BEET MECHANIZATION

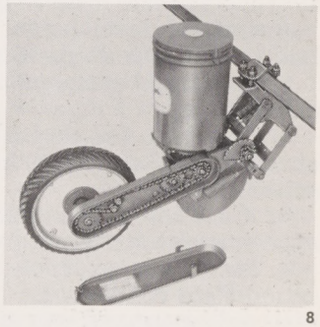
"THE FURROW" is published by John Deere and distributed by John Deere dealers. The January, 1966, issue is devoted entirely to sugar beets, and is replete with factual reports from beet growers in all parts of the United States.

John Deere implements specially designed for the sugar beet grower are described in detail. Every tool needed, from seed bed to harvest, is illustrated and specifications given.



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THE FURROW for January was devoted entirely to beet production.



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THE 71 FLEXIPLANTER is one of many John Deere specialized beet tools. It embodies many improvements and refinements on its predecessor, the 70—a favorite among California sugar beet growers.

SRECKELS PLANT BREEDING PROGRAM

By JAMES D. SCHULKE, Geneticist,
Spreckels Sugar Company

SUGAR BEETS ARE GROWN for Spreckels Sugar Company under a wide range of environmental conditions which include different climates, soil types, cultural practices and diseases. Each of these factors has some effect on the production of a satisfactory sugar beet crop. It is the responsibility of the Agricultural Research Department of Spreckels Sugar Company to develop improved varieties for each of the major geographical areas which have different climatic and disease factors. It would be possible to produce varieties which have adaptation over a wide area, say all of California. But the locally adapted varieties have greater yield and quality potential than widely adapted varieties, thus benefitting both the growers and the processor.

OBJECTIVES OF A VARIETAL DEVELOPMENT PROGRAM

One principle objective of the Spreckels plant breeding program is to increase, or at least maintain, the quality of the present varieties while at the same time maintaining or increasing the gross sugar yield per acre. Progress in this direction can be achieved in several ways. One way includes increased tolerances to diseases and pests, improved bolting resistance and improvement in tonnage and percent sugar. Another way is to incorporate characteristics in the varieties which enable the grower to produce his beet crop at lower costs. This has been achieved in part by the replacement of multigerm seed with monogerm seed. Other characteristics which we strive to improve include seed germination, rate of emergence, seedling vigor and bolting resistance.

The two types of sugar beet varieties which have been widely used in the United States are open-pollinated and hybrid varieties. The old open-pollinated varieties are rapidly vanishing from the scene, and are being replaced by the more recent hybrid varieties. All of Spreckels efforts for the past few years have been extended toward the production of hybrid varieties exclusively. This approach has been taken since it was shown during the late 1950's that substantial yield increases could be obtained by using hybrid varieties instead of open-pollinated ones.

A varietal development program can be summarized in the four steps listed below:

1. Choosing base populations from which to select individuals.
2. Selecting the desirable individuals within the base populations for achieving the objective characteristics.
3. Combining the selected individuals into an experimental strain or hybrid.
4. Testing the experimental strain or hybrid under actual field conditions.

CHOICE OF POPULATIONS

A varietal development program is initiated by collecting as much information as possible about a large number of segregating populations and inbred lines. Data are collected from plants grown in our observational and selection nurseries for such characteristics as bolting and disease resistance, rate of emergence, seedling vigor, color of foliage and seed characteristics. The main plant breeding nursery is planted each year on the experimental farm at Spreckels. Other nursery sites are in the Sacramento and San Joaquin Valleys, in Southern Oregon and a recent addition has been one at our new factory site near Chandler, Arizona. The locations of these nurseries are chosen so that all of the desired characteristics may be evaluated. These different nurseries also enable us to observe the growth of the breeding stocks and hybrid combinations in the different districts in which beets are grown for Spreckels Sugar Company.

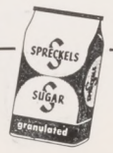
Additional information on populations is obtained from yield data collected from replicated field trials or commercial production of older open-pollinated varieties. In the past few years we have also been screening populations and inbreds for sources of tolerance to virus yellows in innoculation-yield tests conducted on cooperating growers' fields in the Interior Valley. Crosses have been made between some of the identifiable tolerant lines and some outstanding inbred lines. Subsequent segregating generations of these hybrids will serve as base populations for selecting virus yellows resistant plants.

The populations and inbreds which are planted in the nurseries come from several sources. Most have been derived in our plant breeding program in recent years. But introductions are also received from U.S.D.A. Research Stations throughout the United States and from foreign countries. These introductions are important sources of germ plasm for specific characteristics which may subsequently be incorporated into our own breeding lines. The introductions also serve as a source of genetic diversity, contributing to the productivity of hybrids.

SELECTION OF INDIVIDUALS

The selection of desirable individuals from the base populations is also accomplished in the plant breeding nurseries. Hundreds of different breeding stocks are grown each year in the nurseries for selection work or just for observational purposes throughout the growing season. Individual plants can be selected at any time, but selections are usually made toward the end of the season. Individuals may be selected for only one characteristic, bolting resistance for example. However, plants are also selected for a number of traits simultaneously. For instance, plants may be marked for possessing good green foliage and later be dug for being non-bolting. The non-bolting roots may then be screened for root size or shape, and finally the roots which have passed all of the previous tests may be analyzed for sugar content or other quality factors. Thousands of plants are grown each year for the sole purpose of this type of selection program.

In order to produce a seed stalk, (or "bolter") the plants must undergo a certain sequence of environmental requirements. These are successively: sufficient warmth for some vegetative growth; a period of low temperatures called thermal induction, and



finally warm temperatures for resumption of growth coupled with long daylengths. The individual roots which have been selected from the nurseries have already had their initial growth period. The thermal induction requirement is obtained by placing the selected roots in a refrigerated cold room located at Spreckels. After the cold treatment, which may vary from 30 to 120 days, the roots are transplanted for seed production into the greenhouse or in small isolated plots.



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A specially built greenhouse with isolated compartments is used at Spreckels for growing sugar beet strains to be used for cross-pollination. Filtered air is supplied under pressure to eliminate foreign pollen.

The seed harvested from the selections is utilized in several ways. Some of it is planted in the nursery from which it was selected. This allows us to determine the extent of progress which was made by the selections. The plants may possibly be used for another cycle of selection. Some of the seed may also be planted into another nursery for evaluation of a different characteristic. For example, curly top selections from our San Joaquin Valley nursery may be evaluated for, or selected for bolting resistance the next year from the nursery at Spreckels. Seed from selections is also planted in our Oregon overwintering nursery, where the plants receive their thermal induction requirement. In the early spring the stecklings (beet roots an inch or two in diameter) are transplanted from the Oregon nursery into isolation crossing plots, or into the greenhouse. The isolation plots are used for interpollination among a group of plants for a seed increase. Plants are grown in the greenhouse for crossing or inbreeding individual plants by bagging the seed stalks.



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Seed from selected strains is planted in Oregon; overwintered to induce bolting, and re-examined before digging stecklings.



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Stecklings are then planted in isolation plots in other parts of Oregon; pollination can be limited to the particular strains selected.

COMBINATION OF SELECTIONS

Experimental hybrids are produced by crossing two breeding lines in small isolation plots. Isolation is required for controlled cross-pollination because sugar beet pollen is readily disseminated by wind. Generally one of the lines is an established line actually used in commercial production. The other line is generally a recent selection or introduction which needs to be evaluated for its yielding ability.

One of the two breeding lines used in the production of a hybrid is a "male sterile," or female parent. The other line is a pollen producer, or male parent. The females are normal looking sugar beet plants except that the male parts of the flowers produce no pollen — hence the name "male sterile". Male steriles are developed through a series of crossings using special genetically endowed pollinators. In the isolation plots all of the seeds produced on the male sterile plants can only be the result of fertilization by the pollen-producing parent in the plot. The hybrid seed is then used in our yield testing pro-



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The first step in a hybrid beet breeding program is to pollinate male-sterile flowers of one selected plant with pollen from another selection — generally an inbred.

Continued on Next Page

gram — the final evaluation of a new selection.

The first experimental hybrid produced with a recent selection is designed so that it predicts the average performance of the selection if it was to be crossed to a series of other lines. If the first hybrid indicates the average performance is high then a series of hybrids are made to determine which specific cross produces the greatest return of sugar per acre. It can be seen that as the number of inbred lines are increased the determination of the best combination becomes exceedingly difficult. Fortunately, earlier research by geneticists and plant breeders have provided us with accurate predictive methods whereby the number of combinations that need to be tested are kept within reason.

EVALUATION OF EXPERIMENTAL HYBRIDS

In a single year we may evaluate as many as 200 experimental hybrids — some are introductions, but most are produced by Spreckels. These hybrids are evaluated for yielding ability in replicated trials throughout our beet growing districts.

These trials are located on our own experimental farms, and on land of cooperating growers. Included in these tests for comparisons are the present commercial varieties. Only a small number of the experimental hybrids prove to be superior in yield to the commercial checks. More of these seemingly superior hybrids are eliminated by further testing on a broader scale in the second and third year. In 1965, for example, 163 hybrids were evaluated for the first time, 20 hybrids for the second year and 8 hybrids for the third year. Two of these last eight experimental hybrids are now designated for commercial production.

At the same time as the second and third year tests are being conducted, increases of the seed supply are initiated for the new parental lines that produced the high yielding hybrids. Many of the initial seed increases are subsequently destroyed as additional information reveals that the experimental hybrid is not superior to the existing commercial varieties. This practice may seem wasteful, but the cost is low in relation to the value of time saved, which may be 1 or 2 years if the experimental hybrid proves worthy of commercial production.

During the last decade important changes have taken place with respect to varietal development in the sugar beet industry. Multigerm hybrids replaced the open-pollinated varieties and became the standard commercial varieties. This change-over had not been fully completed when monogerm hybrids were developed that were equal or superior to their multigerm equivalents. Because of their potential to give a uniform stand of single seedlings with precision planting, the monogerm hybrids are replacicng the multigerm hybrids.

It is probable that most of the advantages of hybrids compared to open-pollinated varieties have already been realized. However, we are continuing our search for improved hybrids even though the suspected increase may be relatively small. These small increases become highly significant for both the grower and the processor when accumulated over large acreages.

SUGAR BEET SEED PRODUCTION

By GEORGE W. WHEATLEY, Agronomist,
Spreckels Sugar Company

SUGAR BEETS are biennial plants. The first year that beet seed is planted, seedlings emerge and produce leaves and roots. The second year a seed stalk develops, which flowers and produces seed. These processes occur only if certain necessary conditions are fulfilled.

The first year that seed is planted conditions for rapid growth and development of the beets are necessary. The period of rapid growth should be followed by a gradual change to lower temperatures, conditioning the beets so they will not be damaged or killed by sub freezing temperatures. During these low temperatures in winter the beet plants are in a semi-dormant state. With spring there occurs increased temperatures, longer days and an increase in the beet growth rate. The spring and subsequent summer growth of the beets is characterized by new leaf development, some increase in root size, and seed stalk development with flowers and seed.

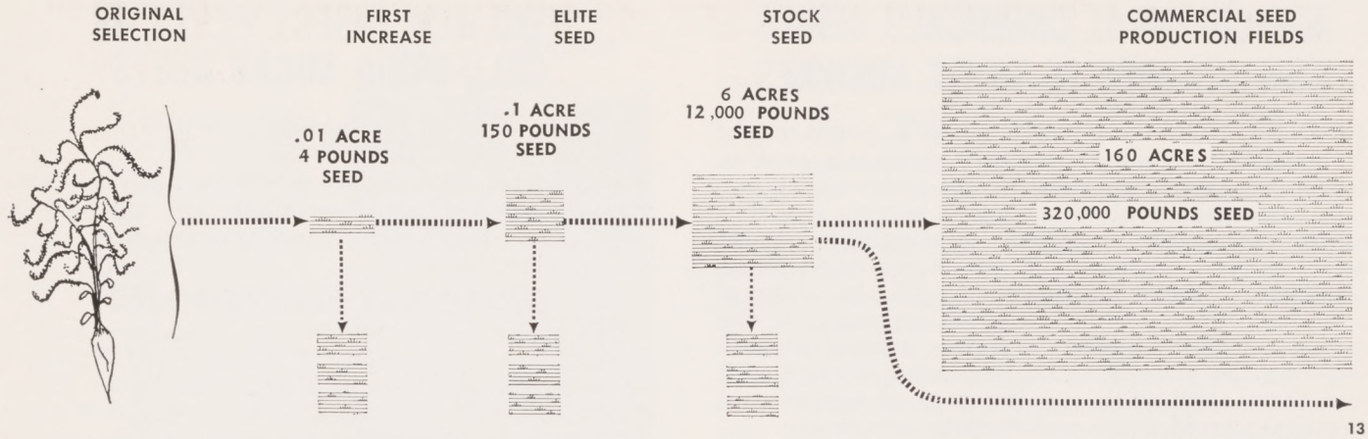
To meet these growth requirements for Spreckels Sugar Company's beet seed production, the seed is planted in July or August in Oregon under the direction of the West Coast Beet Seed Company. Mature seed is harvested during July and August the following year, 12 or 13 months after planting.

The transfer of pollen from beet flower to beet flower in beet seed production is accomplished principally by air movements. To prevent contamination between breeding lines and varieties, adequate isolation between fields is very important. This isolation is accomplished by planting fields several miles apart, with intervening hills, mountains and forests.

STOCK SEED PRODUCTION

Seed from breeding lines which have demonstrated superior performance (yield of sugar per acre) is produced in small isolation plots. The beets in the isolation plots are observed frequently during the process of producing a seed crop to make certain there are no off-type plants which could contaminate the seed increase. The size of the initial stock seed increase depends largely upon the amount of seed that is available from the greenhouse seed increase after all the testing is completed. Frequently, quantities of seed as small as 1/100 of a pound are all that is available. When this amount of seed is planted, three or four pounds of seed can be obtained from the first increase. The next seed increase is made in the same manner, except on a larger scale. Three or four pounds of seed will plant as much as one half acre of beets for seed. As much as five hundred pounds of seed can be harvested from a half-acre stock seed planting.

For each two-way commercial hybrid variety of sugar beets produced, two parental lines must be maintained for commercial seed production. (An example of this follows: A = a male sterile or female parent line which produces no pollen, B = a pollinator or male parent line. A × B = AB which is the commercial hybrid seed obtained from a specific



A schematic diagram of the steps in commercial beet seed production, starting with a single plant of an improved strain.

cross involving two breeding lines.)

When three or four breeding lines are crossed to produce three- or four-way cross commercial hybrid varieties, three and four parental lines, respectively, must be maintained.

COMMERCIAL HYBRID SEED PLANTINGS

Commercial hybrid beet seed is produced from solid field row plantings or strip row plantings, depending upon the seed characteristics of the pollinator. Continuous field row plantings are made when the pollinator has a large multigerm seed. All the seed from solid row plantings is harvested, and after cleaning the multigerm seed is removed by passing the seed over a set of screens which separate the eliptical-shaped smaller monogerm (hybrid) seed from the larger, round multigerm pollinator seed. Only the monogerm seed fraction is used for commercial beet plantings, and the multigerm seed is discarded from this type of a seed increase.

But when the male parent seed is monogerm, or is a breeding line which produces a small multigerm seed, monogerm seed of the male sterile is mixed with the large multigerm seed of the pollinator, using 19 parts female parent seed to 1 part male parent seed. Four-row strips of pollinator seed are planted, two rows skipped, sixteen rows of the monogerm male-sterile seed are planted, two rows skipped, and so forth. Commercial hybrid beet seed is then harvested from the 16 row strips of male sterile seed in the strip plantings.

Proper identification of each breeding line and commercial variety of seed produced is very important. Seed is identified by variety and a lot number which identifies the field from which it came. This requires the utmost care in labeling and handling of all seed. Constant cooperation, involving sugar company, seed company and seed grower is maintained in weed control, insect control, cultural practices and rogueing.

Each whole seed lot is sampled as it is threshed, and the sample is forwarded to Spreckels, California, for evaluation. Each sample is checked for foreign materials such as grain seeds, vetch seed, weed seeds, straw or sticks, etc. In addition, the seed is sized and germination percentages are determined. Germination and purity percentages are determined by West Coast Beet Seed Company, also.

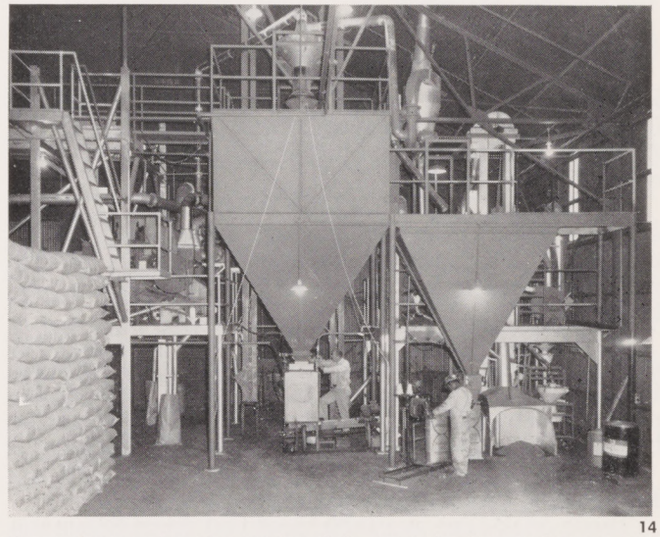
SEED PROCESSING

Seed from Oregon is received at Spreckels, California, in carload and truckload quantities for processing after cleaning and bagging by West Coast Beet Seed Company.

The whole seed has a size range from 7/64 inch to approximately 20/64 inch in diameter. The whole seed is run through a decorticator, which removes some corky exterior of the seed as it passes between an abrasive plate rotating against a hard rubber surface. The decortication process polishes the larger seeds so the seed will be more uniform in size.

After polishing, screens select that portion of seed between 7½/64 inch and 9½/64 inch in diameter, and 8/64 inches in thickness. An aspirator (air classifier) removes the dust and light seeds.

Continued on Page 12



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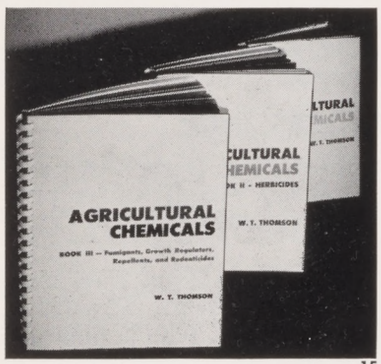
The seed processing plant at Spreckels. Here the beet seed is received from Oregon, cleaned, decorticated, treated for protection from fungi and insects, and packed into 25- and 50-pound bags.

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A few mishaps in recent years, largely mistakes on the part of the applicator, have gained national attention and caused much public confusion about pesticides. Attacks on the use of agricultural chemicals have been coming from all segments of the country. Only by taking the proper precautions and knowing the materials that are being worked with and their application can the user of agricultural chemicals avoid these unfortunate occurances.

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Ranchers, county agricultural agents, pest control operators, chemical manufacturers, greenskeepers, research workers, agronomists and many others whose work involves them with agricultural chemicals have found these books to be an excellent reference and practical guide to usage. And so have many sugar beet growers.

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TWO NEW INSECT PESTS OF CALIFORNIA SUGAR BEETS

By DR. W. HARRY LANGE
University of California, Davis

IN RECENT YEARS two new pests have appeared in California sugar beet fields and this article calls their attention to those interested in sugar beet production.

SUGAR BEET PETIOLE BORER

The sugar beet petiole borer, *Cosmobaris americana* Casey, was found by J. L. Joos and F. Kegel infesting several fields on Union Island near Tracy on July 10, 1962. One field of 40 acres was heavily infested with the weevil when examined September 5, 1962. On June 18, 1964 it was collected by entomologists of the State Department of Agriculture near Mendota, Fresno County.

The first record of this weevil in California seems to be a collection from Isleton from Swiss chard on November 2, 1943, according to a record furnished by Kelvin Dorward of the United States Department of Agriculture.

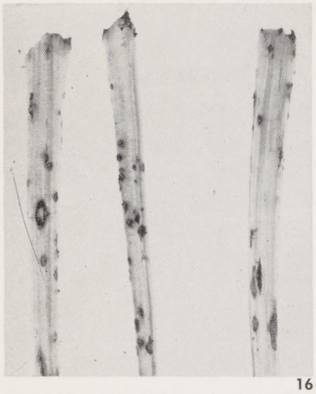
The economic potentiality of this European weevil to California sugar beets is not known. It is recorded from California, Colorado, Kansas, Maryland, Massachusetts, New Jersey, New York, North Carolina, Ontario (Canada), Pennsylvania, Rhode Island, South Carolina and Virginia.

At Union Island (September 5, 1962) an examination of 22 old leaves gave a total of 14 small and 14 large larvae and 12 dead larvae. A second count of 30 leaves taken at random gave a total of 469 punctures (range of 0 to 36), 19 small larvae, 16 large and 4 viable eggs. Many eggs appeared to have hatched but larvae did not become established. A few eggs did not hatch due to unknown causes. The elongate, often raised, egg scars are not unlike lygus bug egg punctures, but if the attack is successful the darkened areas extend longitudinally and under closer scrutinization the central focus of egg deposition can be seen — and often the old egg shell. The scars on the leaf veins or petioles are diagnostic of weevil attack as seen in Fig. 1. If the attack is unsuccessful the scars often become raised. In successful attacks the scars often extend as the whitish larvae extend their burrowings.

Adults of the sugar beet petiole borer are typical weevils (as seen in Fig. 2), about ⅛ inch long and are covered with white, pale brown and yellow scales. The stout beak is curved back toward the body and is about as long as the prothorax. The prothorax has distinct punctations and the legs are stout and covered with scales. Eggs are inserted into the leaf veins and petioles (see Fig. 3) and the whitish larvae cause the typical necrotic spots. The flattish eggs are ovate in shape and are inserted into the tissues. The larvae are easily uncovered as they feed shallowly and as they become mature often occur in a mass of frass (see Fig. 4). The older leaves are usually chosen for attack and from one to four or five adults are often found in the centers of the plants. They often fall off when dis-

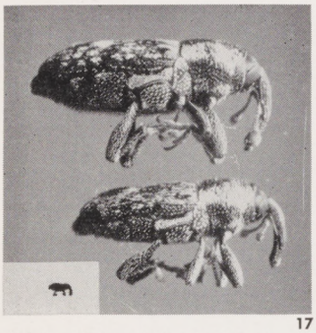


THE SUGAR BEET PETIOLE BORER



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Fig. 1. Sugar beet petioles showing scars of the Sugar Beet Petiole Borer.



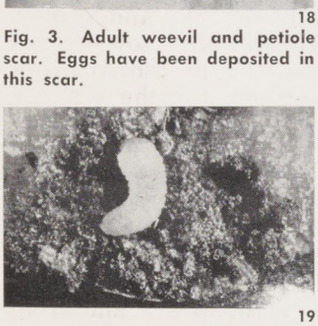
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Fig. 2. Adults of the Petiole Borer, Cosmobaris americana **Casey (X10)**



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Fig. 3. Adult weevil and petiole scar. Eggs have been deposited in this scar.



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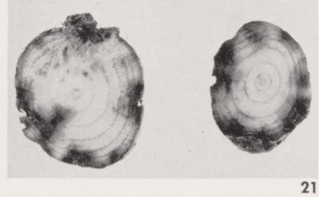
Fig. 4. Mature larva of the Petiole Borer, surrounded by frass in scar.

THE ROUGH-SKINNED CUTWORM



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Fig. 5. Damage to sugar beet roots by larvae of Rough-Skinned Cutworm.



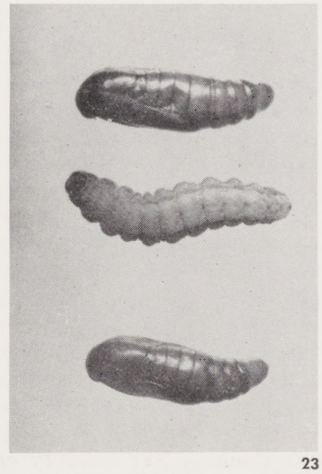
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Fig. 6. Cross section of same roots showing damage from secondary infection.



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Fig. 7. Mature caterpillar of Rough-Skinned Cutworm, Proxenus mindara **B. & McD. (Life size).**



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Fig. 8. Pupae and pre-pupal larva of Proxenus mindara **B. & McD.**

turbed and for this reason cannot always be collected by means of a sweep net. Adults were found feeding on Wormseed Goosefoot (*Chenopodium ambrosioides*) and Lambs'-quarters (*C. album*) although no larvae were found. These weeds often occur in or near sugar beet fields.

The seasonal cycle of this weevil is not known in California. It appears that several generations occur a year. The larvae appeared to over-winter in old dead leaf petioles and often in heavy attacks the petioles are irregularly swollen due to earlier larval feeding. It also appears that adults overwinter under clods or plant debris.

The irregular occurrence of the petiole borer has not made control necessary to date. It appears that heavy infestations are necessary for economic damage. In the laboratory weevils were able to kill small plants.

ROUGH-SKINNED CUTWORM

The rough-skinned cutworm, *Proxenus mindara* B. and McD., was first noticed by O. G. Bacon and M. Frost damaging sweet potatoes near Fresno in 1958. In 1960 attacks of this noctuid were found on sugar beets in the Salinas Valley, particularly adjacent to strawberries, a favorite host. It has become a pest of cantaloupes and beans in the San Joaquin Valley and is widely distributed in California. Attacks on tomato fruits and on cucumbers have also been observed in the Salinas Valley. In laboratory studies at Davis conducted with J. S. Buckett it fed on honeydew melon, squash, watermelon, cotton and pumpkin, but did not feed on alfalfa, lettuce and broccoli. A grass (*Bromus rigidus*) is a favorite field host as is Cheeseweed (*Malva parviflora*).

The nondescript larvae of *Proxenus mindara* vary in color from light tan to brown, are about one inch long when mature and the skin is characteristically set with minute granules. A dorsal broken medial line is diagnostic with white spotting on the posterior part of each segment. Laterally a darker band runs the length of the body outlined above and below with thin, often interrupted white lines (see Fig. 7). The larvae feed on foliage touching the ground but most of the damage occurs to the roots where typical feeding consists of black, gouged out areas which often run together making elongate darkened blemishes. Damage may be superficial or may be deeper and allow for the entrance of decay organisms which eventually kills the beets (see Figs. 5 and 6). Larvae often pupate at the bases of the plants in superficial cocoons or in the soil (Fig. 8). The smoky brown moths have a wing expanse of about one inch with the hind wings white. Adults often rest near the ground under leaves or well camouflaged in protected spots and ordinarily fly only when disturbed. The spherical, ribbed eggs are laid on the foliage in the laboratory, and a single female may lay several hundred eggs. Larvae are found overwintering in the Salinas area and often larvae of all sizes occur throughout the year, thus indicating several generations.

In some areas damage by *Proxenus* may be confused with that of the sugar beet armyworm. While

Continued on next page



damage caused by the armyworm may also occur to the crowns of the plants, foliar feeding is often more extensive. Beet armyworms do not ordinarily occur to as great depths in the soil as *Proxenus*, and the caterpillars are green and lack the skin granules so characteristic of *Proxenus*.

Due to the subterranean habits of the larvae baits have proved more effective than sprays in the control of *Proxenus* larvae affecting sugar beets. Heavy infestations of *Proxenus* on sugar beets during 1962 in the Salinas Valley led to testing several bait combinations in cooperation with N. F. McCalley. A 0.5% Mirex bran bait gave a 86% reduction in cutworms, followed by a pelletized *Bacillus thuringiensis* bait (59%), and a 0.75% endrin bait (45%). In laboratory trials at Davis using pelletized baits best results (96% reduction) were obtained with 1.0% endrin followed by 3.0% zectram (94%), 6.7% of a 75 billion spore count per gram of *Bacillus thuringiensis* (Soil Serv. Inc.) (92%), and 5.0% dylox (88%).

BEET SEED PRODUCTION

Continued from Page 9

Seeds larger than 9½/64 inch in diameter are further decorticated and the small seed and particles are discarded. Frequent checks are made to prevent excessive processing, which could cause a reduction in the emergence potential of the seed.

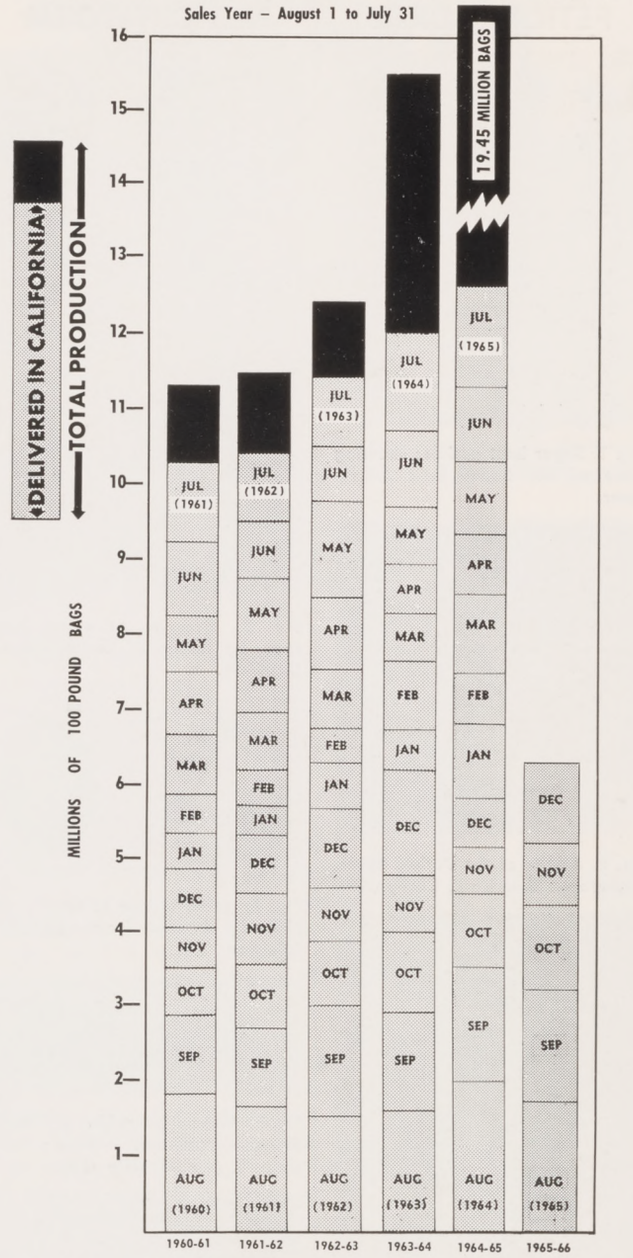
Several samples are tested from each lot of seed to make certain it is within the proper size range. Germination tests are made in blotters, following procedures outlined in the State and Federal seed regulations. and the emergence potential is determined by planting samples in a sandbox. The sandbox test shows whether or not the beet seedlings have the ability to emerge as normal healthy seedlings under field conditions.

All seed is treated with fungicides and an insecticide. These are effective (within certain limits) for controlling soil-borne fungus organisms that cause damp-off, and wireworms which attack seedlings. Current testing of fungicides and insecticides provide data so that our seed can be treated with those materials which are most effective.

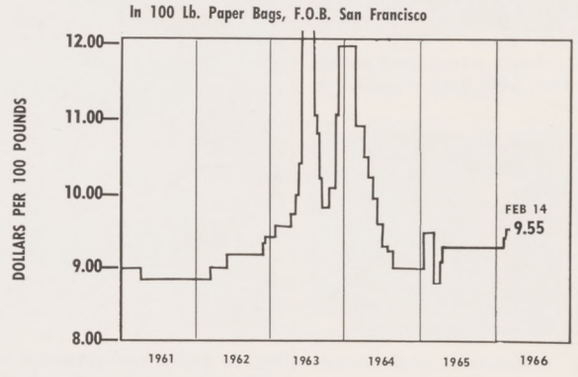
Spreckels Sugar Company seed is bagged in twenty five- and fifty-pound paper bags. These are labeled for variety, lot number, germination and other pertinent data. Distribution of the seed is from the warehouses located at Spreckels Sugar Company's district headquarters, and from commercial warehouses in all the Company's beet growing areas. The seed delivered to each warehouse is limited to those varieties which should be grown in the area supplied by that warehouse.

SPRECKELS SUGAR BEET BULLETIN is issued quarterly by the Agricultural Department of Spreckels Sugar Company as a service to its growers. Mention of specific methods, devices and implements does not constitute an endorsement by the Company. All photographs by the editor unless otherwise indicated.
AUSTIN ARMER, EDITOR
SPRECKELS SUGAR COMPANY WOODLAND, CALIFORNIA

PRODUCTION AND DELIVERIES OF BEET SUGAR



QUOTED PRICE OF BEET GRANULATED SUGAR



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SPRECKELS SUGAR BEET BULLETIN

VOL. 30 SUMMER, 1966 NO. 2



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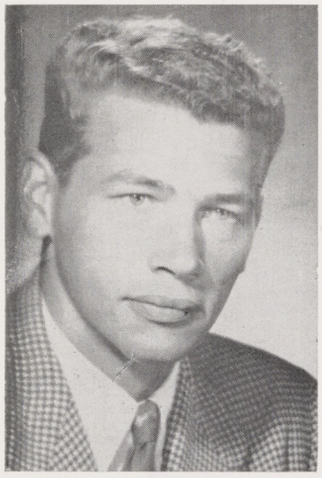
USE WATER WISELY

California's water supply is one of its most precious assets. The California Water Plan collects, conserves and distributes water effectively and efficiently.

It is the obligation of California Agriculture to apply this water with equal effectiveness and efficiency. **See page 14.**

THE EFFICIENT FIELD APPLICATION OF CALIFORNIA'S WATER SUPPLY

By J. N. DAWE, Field Superintendent,
Spreckels Sugar Company, King City



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THE TASK OF IRRIGATING a field of beets may be viewed as the final step, or the end product, of a well planned integrated operation of water management throughout California. When we in agriculture think of the "California Water Plan," we envision a massive project conceived to collect, store and deliver water from the Northern and North Coast areas to areas of water deficiency throughout the rest of the state. The California Water Plan does this indeed, but in addition it provides for the co-ordination of all of the private and public water conservation projects in the state, so as to efficiently manage and conserve this valuable natural resource for years to come.

As evidenced by projects underway, these public agencies are doing an excellent job. The Oroville Dam of the Feather River Project in the North part of the state and the San Luis Dam and reservoirs in the San Joaquin Valley are just two examples of the high return being made on your tax investment.

In the Salinas Valley the Monterey County Irrigation District has proved the effectiveness of conservation management. When Nacimiento Dam was proposed several years ago, water tables in the valley were steadily dropping and the intrusion of salt water along the coastal area of the county was becoming a serious threat to cropping there. Now, in only a few years of use of the dam, the controlled flow of water in the Salinas River throughout the season has reversed the trend of the lowering water tables, and has stemmed the influx of salt along the coast. This year, San Antonio Dam was completed by the same district, and will supplement the benefits of the Nacimiento Dam.

The effectiveness of these agencies in restoring underground water supplies, and providing for future surface water throughout the state should be more than applauded. Because public funds are doing this work, a certain responsibility should be assigned to the recipients of this water. This responsibility could conceivably be spelled out in a supplemental chapter to the numerous documents that define the California Water Plan. In reality this last chapter will never appear in print, even though it is "written" every day on California's farms. The theme of this chapter could be called *The Efficient Field Application of California's Water Supply.* Since this theme is closely related to your farming profits it becomes your responsibility to make *your* portion of the overall plan as effective as the rest of the State's massive effort.

BASIC PRINCIPLES

The basic principles of good water management do not vary from season to season. If you are confident that your basic approach is correct, begin thinking about how you might refine and improve your own good practices. Most plants, and especially sugar beets, will make their best production with fairly constantly sustained moisture. Total quantities of applied water range from three to five feet to make a crop, but the condition for best growth would be sustained below Field Capacity (so that the plants may "breathe"), but well above the Permanent Wilting Point, to avoid any stress. It is not possible to maintain this straight-line condition throughout the season, but we should use it for a target.

The term "sustained moisture" applies to a crop of beets from the time the seed is placed in the soil until harvest. Now that we are moving rapidly toward complete mechanization and precision planting, establishment of a uniform stand of beets is a necessity. This makes pre-plant moisture and immediate post-planting moisture conditions much more critical than ever before. If you can, plant into moisture. Do not, however, sacrifice proper planting depth in reaching for a moist seed location. Then maintain that good moist condition around the seed until you are ready to move into the field with cultivating equipment. You are wise to plan for, and to apply, your own moisture. Historically California's rainfall is either too late, inadequate, or too heavy, to allow proper mechanical operations thereafter. Do not hesitate to "irrigate a stand up". Moisture is the one primary environmental growth factor which you can control. In many beet growing areas, two irrigations are being applied to establish a stand. In these areas, growers find that the second application of water assures them an adequate supply of moisture to carry them through thinning as days get warmer.

Following cultivation and thinning (and probably an application of fertilizer), IRRIGATE again. One of the most popular yet entirely erroneous theories persisting over the years is the one about sugar beet roots going down through dry soil "looking for water". If you can grow a 25 ton crop by using this practice you will probably make 30 tons without it. Beet roots make maximum growth only if they are never stressed for any reason. Consequently you will never attain the maximum growth potential on your land by drying the beets up after thinning.

Stress can occur also from too much water. Logically then, water usage should be scheduled so as to maximize the production on your particular land. This over-irrigation, which can be as fatal as under-irrigation, occurs far less frequently, but it occurs

periodically in localized areas within many individual fields near head-ditches and tail ditches where runs are too long to effectively control applied water. It occurs on sprinkled fields where sprinkler heads are too large, applying more moisture in a given period of time than the soil can absorb. Aside from the losses due to injured beets, over-irrigation is costly. You are getting no dollar return for water that percolates down, out of the root growth zone.

EVERY FIELD IS A SPECIAL CASE

Explicit methods of water application cannot be generally recommended. Your method must fit your situation. Extremely good crops of beets are grown under sub-type irrigation in the Delta region around Stockton, as well as in furrow irrigated fields, sprinkled fields, or combinations of sprinkler and furrow type irrigation everywhere in the state. Sprinklers have the advantage of eliminating an accumulation of nitrogen salts in the top of the bed which can cause unwanted renewed growth late in the season with the advent of pre-harvest rains. However, the "best" way to irrigate is the way which meets your field's needs for applied water. To improve your water-use efficiency, closely examine your practices. If you are running water in quarter mile long furrows and growth is not uniform, shorten the runs by half. Field studies have shown that on heavy soils with little fall, 300 feet is the maximum distance that water should be moved in one set. To attempt to push water further results in drowning the first 300 feet, or depriving the second 300 feet of applied water. Likewise, if crusting is a problem or puddling and runoff occurs with sprinklers, reduce the size of the sprinkler nozzles—for example, from 5/32 inch to 9/64 inch. In the last couple of years many growers have reported increased yields (in well documented field tests) by going down to 1/8 inch sprinkler nozzles. The answer is, of course, that all the water that is applied is utilized by the plants. Larger nozzles had applied more water than could be absorbed, so excesses ponded in low areas or ran out the field in a waste ditch. Above all, don't let blind loyalty to past practices keep you from experimenting with new and possibly better methods of water application.



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INEFFICIENT APPLICATION of irrigation water is illustrated by this flooded beet field, where land was improperly graded and runs were too long.



Photographer Unknown 28

SPRINKLER IRRIGATION is ideal for unlevel fields, but can result in too much (as well as too little) water applied to the crop.

IRRIGATION TIMING

Another essential in maximizing your water use is that of timing. It has been expressed many times that a relatively light but frequent irrigation schedule is preferable to a heavy, infrequent schedule, for growing beets. This is in accord with the sustained moisture idea mentioned earlier. However the range of limitations on timing is completely dependent on the rest of your farming operation. That is why plans for timing irrigations must start with your cropping plan for the entire year. A timing schedule should be designed to cope with the most extreme situations you would normally expect each season. Provide for emergency situations by keeping schedules on the frequent side, so that you may be ahead of schedule rather than behind when and if that well goes out, or the weather turns unseasonally warm. It is not possible to give a general recommendation on when to irrigate, or to define the "ideal" interval for irrigation. Some operators on sandy soils run their pumps nearly continuously through the growing season, while others in cooler coastal areas, or on heavy clay soils, are getting by during peak water usage months with a three-week schedule. The key to the whole thing is to stay ahead of the beets. If they wilt you are late. One period of water stress cannot be rectified later in the season. While the method in which you irrigate is closely related to your economy of water use, and returns you dollars for water saved, timing pays it's handsomest profits in the form of increased yields. Growers have stated, "That last irrigation is the one that made my profit", referring to the additional growth which seems to occur following the final watering of a field of beets. Conversely then, dwell on the thought that the one irrigation which was missed or delayed is the one that deprives you of that profit.

While irrigation is not cheap, it is the key to California's successful production record. Nearly all other factors affecting a plant's growth are dependent on moisture. Consequently, the dollars you spend toward maximizing your water use through efficient application and proper timing will have more effect on the profits you make than any other single item in your budget.

A REVIEW OF THE 1965 CROP

By JOHN M. KENDRICK, Agricultural Manager
Spreckels Sugar Company

THE 1965 CROP was far from the best crop harvested by Spreckels' growers. It was, in fact, on the average, the lowest yielding of recent years. But in spite of the lower average, individual growers produced excellent crops in some areas, as demonstrated by the remarkably large Honor Roll in this issue. Since yields and sugar content varied widely, a district by district review will be undertaken with the hope that some useful information may be presented.

DISTRICT 1 — COASTAL DISTRICT

The coastal area produced one of the poorest crops ever recorded for the area. The yield averaged just over 19 tons per acre and sucrose content averaged under 14.0%. The previous five-year average for the same area was over 25 tons per acre and over 14.8% sugar. The yield was the lowest since 1948, and sucrose was lower only in 1904.

Certainly a number of factors combined to produce these results, not the least of which was the yellow virus. The disease was widely spread over the district so that few beets were able to escape its effect.

In addition, labor was scarce and expensive. As a result field work in many instances was untimely and costly, and the quality of workmanship left much to be desired.

Reference to the graph (page 17) shows that sugar percent was at its best at the beginning of harvest and declined as the fall season progressed. Both sugar content and beet purity show the same trend, so that growers who delayed harvest produced beets of lower quality, even though some additional tonnage may have been produced.

DISTRICT 2 — NORTH SAN JOAQUIN

District 2 demonstrates very well the confusing inconsistencies of the 1965 crop. The north San Joaquin Valley produced the highest sucrose content beets in many years, and averaged almost ¾ of a percentage point above the previous five-year average. Tonnage compared well with the averages, being similar to the five-year average but more than two tons per acre under the 1964 crop. 1964 produced the best yield in the six-year period, 1960-65.)

The trend in sugar content and purity in District 2 is also interesting (see graph, District 2). From the commencement of harvest in September, both sucrose and beet purity improved until about mid-November when it rained. After that time, the harvest operation was spasmodic, and the factory operated on local piled beets, a small local harvest, and beets imported from small stockpiles in Nevada. After mid-November, beet purity and sugar percent declined, probably altogether due to wet ground.

The spring operation started on beets harvested from moisture-saturated soils, resulting in low sugar content and beet purities. Both values steadily climbed during the spring harvest as the soil dried and a growing crop depleted soil nitrogen supplies. Sugar and purity remained at high levels throughout Manteca's spring operation until the termination of harvest, when they tended to decline. The consistently best quality beets of the entire crop were harvested during the spring operation.

DISTRICT 3 — SACRAMENTO VALLEY

Most everything that was reported for District 2 may also be said of the Sacramento Valley area. The 1965 crop yield was approximately 1½ ton per acre over the average of the previous five years and sugar content was nearly a full percentage point over the average sugar content for the same period. While only a small portion of the Sacramento Valley acreage was harvested prior to the November rains, the beets harvested in the spring were superior in quality (see graph, District 3), so that many farmers in this area benefitted from the delay. No doubt additional harvest cost was incurred on account of hard dry fields and seed stalks. However, the bulk of the spring acreage was harvested under reasonably normal conditions.

DISTRICT 4 — SOUTH SAN JOAQUIN

In the South San Joaquin District, the origin of most of the July-August tonnage harvested by Spreckels' growers, generally good yields were experienced. The district as a whole average over 20 tons, the second highest yield since 1960. The only year in the previous five-year period which exceeded last year's yield per acre was 1963, when the area averaged just above 23 tons per acre.

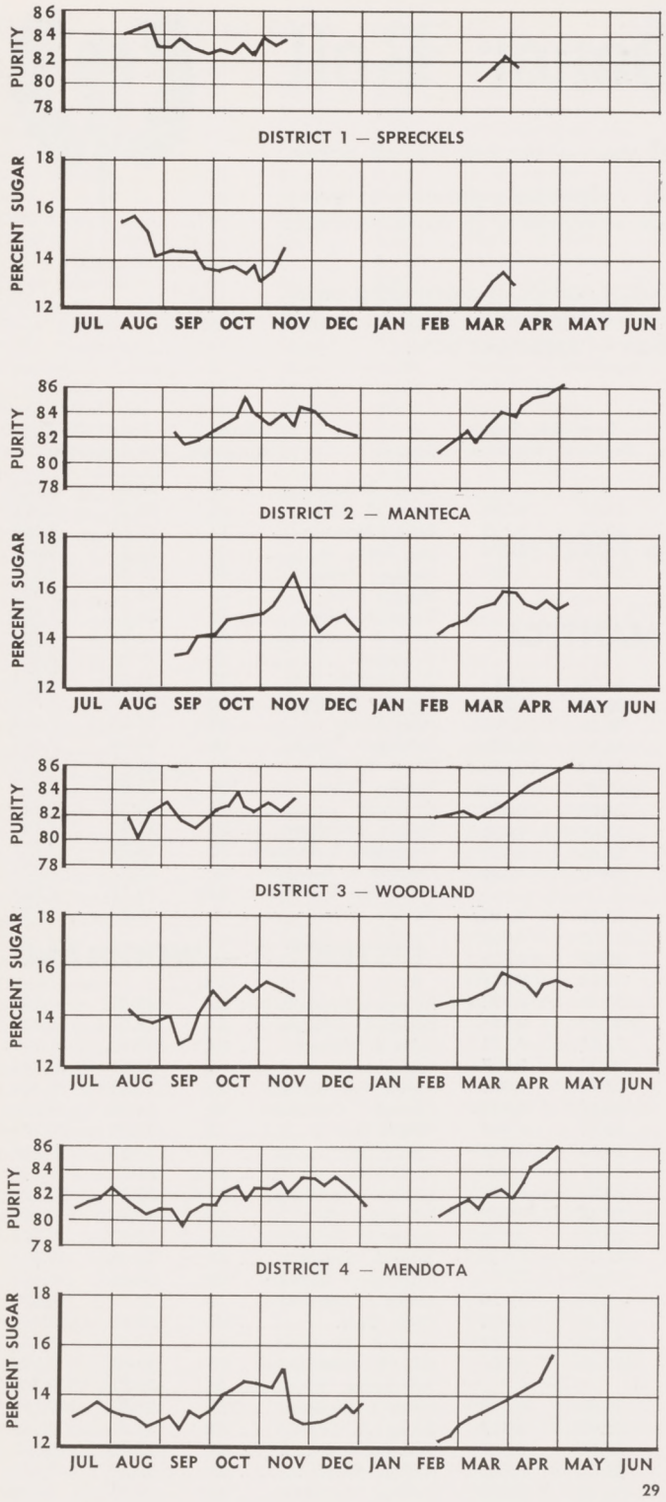
A slightly different record resulted with respect to beet quality. Both sucrose content and beet purity were low (see graph, District 4). The sugar content was about half a percentage point below the average of the previous five-year period.

In the extreme south it is suspected that excessive nitrogen at time of harvest could be a contributor to low sugars and purities under short growing season conditions. For the 1966 crop, growers in the area are cooperating extremely well in the use of nitrogen strips to evaluate individual field requirements for nitrogen, and consequently should apply only the actual need of the crop.

It is suspected an even better record would have been achieved in District 4 had it not been for a serious virus yellows infection in the portion of the district adjoining the Mendota factory to the east and south. The sections of District 4 located at the Burrel, Lincoln and factory receiving stations averaged little better than 18 tons per acre.

While it is early to predict the outcome of the 1966 crop, many of the early plantings which looked sickly at this time last year appear to be thrifty and progressing very well this year. If the crop continues unimpeded in this direction, 1966 will surely be a better yielding year than 1965. It will also be a better year with respect to sucrose content if, because of continued growth and proper application of nitrogen, fields are harvested after available nitrogen becomes deficient.





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PERCENT SUGAR and PURITY for the 1965 crop in each of the four factory districts. Note that each area has its own unique trend.

District 1 shows declining sugar and purity as the season progresses.

District 2 sugar percent peaks in November and late March, with maximum purity at the end of spring harvest.

District 3 sugar percent trends upward throughout the entire harvest, as does purity.

District 4 curves are erratic because early fall harvest starts in Kern County, and progresses northward during the season.

MUST CITIES OVERWHELM CALIFORNIA FARM LANDS?

CALIFORNIA'S SEVEN MILLION ACRES of prime agricultural lands, source of much of the state and national food supply and a key element in the total state economy, are under massive assault from "urbanization."*

Emil M. Mrak, chancellor of the University of California, Davis, and president of the International Congress of Food Science and Technology, warns that "bold action" must be taken to retain our finest agricultural areas for future production. He calls the California situation part of a national problem.

Chancellor Mrak, assisted by figures compiled by chancellor Daniel Aldrich of the University of California, Irvine, emphasizes a little-noted but vital point: the fact that urban development, although expected to take only about four percent of California's land total by 1975, is occurring on the "very finest agricultural land". Only seven million out of California's 100 million acres are classified as prime agricultural, according to Mrak, and "about 700,000 acres of this best land may well be lost by 1975. This is indeed a tremendous production area."

Mrak declares that to meet our future food production requirements, "we will need all the land available, even though we are improving production methods and bringing in new lands through irrigation."

"I have been astonished to discover," Mrak adds, "that some of our city planners are not at all concerned about the removal of our finest agricultural land from farming. They seem to believe that as the cities take over our best lands we can happily move the growing of our food out into the poorer areas. They are not perturbed by the fact that California's suburbs are gobbling up 375 acres of open farm land every day."

To hold the line on agricultural acreage, control tools already available such as zoning, tax relief for open lands, purchase of development rights and land purchase must be "sharpened and used," the author concludes, and appropriate new tools developed.

Chancellor Mrak summarizes:

"We know that if we want to we can insist that housing and industry and other developments be located on lovely rolling hills instead of on desirable agricultural land. We know we can run our highways along the edges of the fine land instead of through it.

"We know that we can guide development rather than suffer it."

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* Detailed documentation for this rapidly worsening threat to the state's future is contained in the Summer issue of CRY CALIFORNIA, quarterly magazine sponsored by California Tomorrow, a state-wide group dedicated to maintaining a productive and beautiful California.



The 1965 Honor Roll

1965 was a below-average beet year — on that we all agree.

Yet, with the exception of District 1, Spreckels growers in every district produced 25 ton or better yields on as many or more contracts as in most recent years.

We call your attention to the listing of names in descending order of "Pounds of Sugar per Acre," giving recognition in relation to the true merit of sugar beet crop production — sugar per acre.

DISTRICT 1 — SALINAS

Grower	Acres Harvested	Tons Per Acre	Lbs. Sugar Per Acre
John O. Anderson	20	33.56	10,001
Linc & Ben Handley	18	33.74	9,319
Tondre Alarid	9	31.25	9,163
West Coast Farms	24	35.23	8,991
Gilroy Produce Dist., Inc.	35	31.09	8,867
Ernest Homen	14	29.95	8,620
Jesse G. Homen	15	29.54	8,531
John DeCarli & Son	17	29.90	8,318
Paul G. Milladin Fruit Co.	14	29.01	8,291
Tognetti & Fillepelli	35	30.55	8,285
Harry R. Semas	49	26.76	8,167
S. K. Rhodes	6	31.74	8,132
Raymond & William Gularte	26	25.08	8,021
Foster Hutchings	23	29.45	7,987
West Coast Farms	43	31.67	7,937
West Coast Farms	31	29.62	7,903
Porter Berry Farm	32	28.13	7,871
J. J. Crosetti	59	29.13	7,848
Bruce Church, Inc.	44	26.30	7,832
Wiley Farms, Inc.	22	27.78	7,773
Latasa Bros.	138	25.88	7,759
Herold Ranches	37	27.67	7,737
Joseph Gubser, Sr.	9	26.95	7,554
Leon J. Lazo	9	27.54	7,524
Wiley Farms, Inc.	21	25.86	7,505
The Garin Co.	63	28.70	7,502
Robert A. Smith	8	31.87	7,324
L. C. H. Company	27	26.26	7,264
Bruce Church, Inc.	49	27.19	7,189
Hansen & Fowler	141	25.13	7,172
Floyd W. Stanphill	31	25.62	7,148
Tom Hambey & Son	46	25.59	7,119
Harry R. Semas	39	26.45	7,089
Silveria Bros.	35	28.16	7,074
The Garin Co.	10	28.34	7,045
Henry Signorotti	15	25.76	6,996
B. & M. Farms	20	28.26	6,992
Schween Bros.	10	26.45	6,988
James A. Petit	29	25.85	6,974
Merit Packing Co.	51	25.82	6,935
John Pryor	68	25.33	6,920
W. M. Sullivan	71	25.00	6,905
Martella & Buzzini	30	25.35	6,890
Joseph Gubser, Sr.	18	26.17	6,883
Herold Ranches	90	25.64	6,764
Burke Farm Co.	46	25.43	6,693
Peter A. Stolich Co., Inc.	29	25.23	6,661
Harless Bros.	8	25.48	6,630
Arnold Bassetti & Sons	61	25.48	6,610
Raymond Martin	67	25.05	6,503
Robert J. Lindeleaf	43	26.27	6,489
D. H. Wynne	12	25.25	6,489
Peter A. Stolich Co., Inc.	59	25.57	6,336
Mine Bros.	12	26.43	6,132
J. J. Crosetti	40	26.39	5,996
Tony F. Silveira, Jr.	15	25.60	5,862

DISTRICT 2 — MANTECA

Grower	Acres Harvested	Tons Per Acre	Lbs. Sugar Per Acre
Dexter Bros.	59	34.66	11,784
Edward Maberto	38	36.37	11,718
Joseph Toste, Jr.	38	37.51	10,713
Edward Maberto	43	32.10	10,400
Stephen Pellegri	76	34.94	10,279
Joe Gambini	47	37.50	10,178
Stephen Pellegri	21	34.17	9,957
Frank Raspo	39	32.41	9,943
James A. Luis	89	30.40	9,929
Nat Bacchetti	36	29.70	9,599
San Julian Bros. & Zabalza	37	30.95	9,440
Theodore R. Baskette	81	31.02	9,362
Edward Maberto	66	29.07	9,326
Tony Pereira	55	31.16	9,311
Enrico Pizzi	10	30.59	9,232
Td Thoming & Sons	110	30.79	9,231
Stephen Pellegri	35	31.88	9,143
Robert Norman	42	29.38	9,037
Merlin Miller	75	27.12	9,036
Geo. Tomura	98	28.09	8,955
Brocchini Bros.	70	29.81	8,907
Tony J. Pereira	36	29.94	8,862
I. L. Pombo & Sons	65	27.07	8,825
Clarence A. Nilsson	69	27.81	8,799
Joseph L. Nomellini	75	27.48	8,777
I. L. Pombo & Sons	72	26.05	8,774
Albert Fonseca	31	26.69	8,728
Tanaka Farms	154	27.27	8,721
Robertson & Sons	101	29.21	8,670
John Mancuso	85	36.56	8,635
Ishida Bros.	150	30.43	8,581
Stephen Pellegri	82	27.34	8,552
San Julian Bros. & Zabalza	37	30.42	8,548
Enos & Woodward	135	25.95	8,517
Enos & Woodward	61	27.62	8,507
Tom Hiraga	25	28.05	8,505
James B. Rodgers	50	26.55	8,480
Carmel Mejia	104	30.32	8,465
George Mitsuda	29	26.25	8,405
Arnaudo Bros.	102	29.51	8,383
Wm. F. Garden	57	26.00	8,346
Enrico Pizzi	4	26.61	8,286
Merlin Miller	73	25.15	8,274
Maciel Bros.	42	27.90	8,242
Alvarez Bros.	170	28.51	8,222
Caminata & Podesta	38	26.94	8,217
Jory Bros.	33	26.23	8,205
Arnaudo Bros.	66	26.81	8,204
Tower & Son	41	26.07	8,123
Grant & Wilson	60	25.27	8,091
Robert Norman	17	25.65	8,069
Joe Ratto, Jr.	70	26.67	8,044
Stephen Pellegri	89	27.87	8,038
Murata Bros.	42	26.13	7,985
Grant & Wilson	53	26.31	7,951
Lucio J Costa	78	26.07	7,884
K. Sasaki	26	29.28	7,818
Giannecchini Bros.	100	25.89	7,814
Tony A. Sanchez	116	28.43	7,796
John Kautz	68	25.06	7,683
Calcagno Farms	26	26.36	7,602
Grant & Wilson	67	25.80	7,570
Tanaka Farms	158	25.09	7,412
K. Sasaki	44	25.74	7,223
Nobuo Sakamoto	50	27.30	7,196
Theordore R. Baskette	73	25.29	7,117
Thomas E. Alderson	67	25.27	7,076
Lovegreen & Wilson	83	25.17	7,063
Murata Bros.	41	26.39	6,883

DISTRICT 3 — WOODLAND

Grower	Acres Harvested	Tons Per Acre	Lbs. Sugar Per Acre
Feliciano Fortes & Son	25	43.78	14,299
Robert C. Schulze, Jr.	34	36.08	11,329
John J. Vanetti	27	37.93	11,159
*Mike Lear	5	36.21	11,145
Solano Farms Corp.	72	33.19	11,105
George T. Dakazaku	39	34.50	10,826
*Mark Lear	5	35.08	10,749
*Joan Lear	5	35.60	10,438
R. R. Peters	36	31.00	10,112
Solano Farms Corp.	73	30.24	10,028
Schroeder Bros.	68	30.87	9,909
James I. Tadlock	36	32.55	9,758
John J. Vanetti	69	31.43	9,693
Nishikawa Brothers	139	33.86	9,623
Ernest J. Weyand	6	28.12	9,572
Chew Bros.	82	29.83	9,552
Fred H. Rehrman	104	27.87	9,454
Kikuichi Matsumoto	95	32.01	9,398
Joe Gnoss, Jr.	78	28.91	9,332
Heidrick Brothers	225	28.83	9,191
James A. Cooley	36	31.92	9,187
J. R. Phillips	44	29.88	9,131
Bulkley Ranch	40	30.57	9,073
Bulkley Ranch	45	28.96	9,030
Ernest J. Weyand	10	28.04	8,990
W. R. Peterson & Son	40	29.86	8,982
Robert C. Schulze	64	30.71	8,955
Bulkley Ranch	41	27.14	8,945
Robert G. Arens	124	29.44	8,944
Clark Davis	17	29.99	8,943
Wm. E. Duncan	72	27.52	8,938
John J. Vanetti	71	29.14	8,917
James M. Campbell	43	30.50	8,900

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* 4-H Club projects

Grower	Acres Harvested	Tons Per Acre	Lbs. Sugar Per Acre
J. L. McClish	72	28.80	8,899
Tom L. Spiva	27	30.73	8,899
Harvey L. Rominger	39	31.44	8,854
Manuel Bastiao	39	31.67	8,836
William A. McDonald	36	26.99	8,826
M. B. Avilla	78	28.63	8,812
John M. Lear	18	29.13	8,809
Carl Hahn	116	30.46	8,803
Lloyd M. Eveland	51	29.73	8,800
T & F Farms, Inc.	120	27.51	8,798
Ernest Dietrich	65	26.52	8,730
Van Smith	120	28.35	8,681
Chew Brothers	359	25.59	8,639
Chew Brothers	144	25.69	8,622
Rosalind G. Criste	36	29.48	8,590
J. W. Jones	70	27.19	8,576
Meek & LeMaitre	128	27.38	8,554
George M. Struve, Jr.	180	26.71	8,553
Dan G. Best	36	35.23	8,526
Ernest J. Weyand	22	27.04	8,447
Manuel Bastiao	35	28.35	8,443
Harry Gimenez	42	26.88	8,430
Keith B. Nelson	74	29.84	8,421
David W. Schulze	34	28.62	8,414
Wilbert Rosa	11	26.44	8,403
Alan Borchard	26	25.64	8,400
James I. Tadlock	45	30.48	8,394
Albert E. Tandy	78	27.88	8,392
Giannoni Bros.	104	27.86	8,369
Robert C. Schulze	189	28.96	8,346
Van Smith	65	27.71	8,330
Chew Brothers	292	25.70	8,322
Rudy Howald	156	28.45	8,319
Alfred W. Cruickshank, Jr.	35	29.30	8,298
C. Kenneth Snyder	40	25.77	8,277
Wetzel Bros.	98	28.66	8,243
Timothy & Blickle	20	27.29	8,209
Timothy & Blickle	15	28.19	8,203
Wallace Brothers	350	27.59	8,183
Wilson Lovvorn	71	26.96	8,158
Roth Bros.	56	26.08	8,137
A. H. Rominger & Sons	90	27.09	8,111
Edgar Everett	132	25.37	8,108
Nishikawa Brothers	46	32.19	8,105
Dan G. Best II	40	32.27	8,100
W. R. Peterson & Son	77	26.33	8,083
M. B. Avilla	73	31.04	8,052
Keith B. Nelson	66	25.38	7,974
Schoeningh Farms	56	28.61	7,965
M. B. Flores	52	25.12	7,933
Harry Gimenez	89	26.86	7,908
Orrick Farms, Inc.	204	28.04	7,874
Rosalind G. Criste	114	28.32	7,867
Wilbur L. Silva	30	27.29	7,854
James I. Tadlock	87	29.91	7,836
Lloyd M. Eveland	127	25.84	7,83!
Lloyd M. Eveland	236	25.04	7,757
Robert C. Gill	89	25.28	7,756
Max Toledo & Son	160	26.70	7,754
Timothy & Blicke	5	26.95	7,745
Vassar & Buckman	43	26.94	7,689
Paul Reiff & Sons	144	26.50	7,680
M. G. Machado	60	26.63	7,669
Wetzel Bros.	86	28.44	7,667
Miramontes Brothers	83	30.39	7,652
James M. Campbell	103	26.09	7,639
Dan G. Best	154	27.65	7,620
Robert J. Rooney	15	25.31	7,618
Frank Alvernez & Son	35	26.64	7,614
Timothy Bros. & Ken Breckenridge	18	25.22	7,606
Wetzel Bros.	44	29.80	7,605
Eldred R. Reel	174	26.82	7,601
Manuel Bastiao	25	25.18	7,594
M & T Farms	38	28.49	7,516
Arnold Collier	68	25.07	7,506
Robert J. Rooney	46	27.98	7,493
Wm. E. Duncan	19	25.44	7,459
James N. Fulmor	25	25.31	7,451
Noboru Hitomi	151	26.45	7,427
Dela Torres Bros.	50	30.99	7,276
Oji Bros. Farm, Inc.	223	25.74	7,259
Tsuji & Inouye	12	26.80	7,166
G. A. Hanks	52	28.07	7,034
Dela Torres Bros.	36	25.52	6,885
Dan Argumendo	25	25.65	6,879
Martin Brothers	34	26.02	6,848
Schneider, Fricke & Schneider	29	25.39	6,805
Harlan & Dumars	36	25.62	6,769
Dela Torres Bros.	35	29.91	6,754
E. L. Wallace & Sons	385	25.85	6,612
Harley C. Rominger	38	26.88	6,489
Wetzel Bros.	118	26.00	6,438
Donald Fong	78	25.36	6,391
Arnold Collier	145	25.13	6,373
Schneider, Fricke & Schneider	46	25.19	6,136
Dela Torres Bros.	56	27.68	5,641

DISTRICT 4 — MENDOTA

Grower	Acres Harvested	Tons Per Acre	Lbs. Sugar Per Acre
Arthur J. Cuelho	15	40.39	13,272
Tony V. Cardoza & Son	19	49.46	13,255
Newhall Land & Farming Co.	22	37.81	10,859
Kenneth E. Royer	8	40.30	10,623
Manuel Vieira, Jr.	25	36.22	10,468
Makin Ranch	69	33.12	10,380
Enrico Farms, Inc.	40	35.88	9,874
Christiana & Skaggs	136	33.25	9,762
Markarian Farms	37	37.39	9,609
Starkey & Erwin	50	32.90	9,580
J. Howard Porter	130	37.50	9,420
Pilibos Bros., Inc.	100	33.52	9,339
Comfort Farms, Inc.	100	26.76	9,232
Walter Willms	70	30.77	9,151
Ralph Terry	29	37.96	9,057
The Desert Ranch	35	28.34	8,967
Pilibos Bros., Inc.	110	35.13	8,832
Luiz Menezes & Sons	22	31.60	8,816
Sullivan & Gragnani	76	28.28	8,806
J. E. Pucheu	27	30.96	8,799
Pilibos Bros., Inc.	40	31.83	8,620
Florence Averill	40	35.88	8,604
Sullivan & Gragnani, Inc.	32	27.11	8,588
Markarian Farms	21	35.85	8,568
Frank Heuer	28	31.73	8,535
J. B. Hawkins Ranch	100	27.20	8,530
Turner Island Farms	486	29.22	8,526
Timco	91	29.71	8,485
Motte Ranches, Inc.	72	28.24	8,399
Carl C. Gunlund	26	27.96	8,377
Crettol Farms	34	31.44	8,376
Markarian Farms	19	32.98	8,278
Parsons Ranch	54	32.15	8,243
Sullivan & Gragnani	104	28.81	8,240
Cerro Brothers	31	34.82	8,231
Paul W. Demkey	39	31.72	8,228
Houchin Bros. Farming Co.	51	32.15	8,218
Eugene Nord	26	32.22	8,171
Mitchell & Johansen	70	31.34	8,167
Hedman Ranches	100	27.39	8,135
Oink Farms	2	29.01	8,134
Crettol Farms	78	28.86	8,127
Andrew Hardy, Jr.	14	29.58	8,111
A. H. Wegis & Sons	146	32.56	8,107
J. Sanchez & Sons	36	26.02	8,103
Harold O'Banion	55	32.05	8,102
Barnard Brothers	43	31.29	8,048
S & S Ranch, Inc.	73	29.16	8,042
Cleo Smith	9	30.16	8,035
Hugh S. Jewett	35	30.40	7,983
Floyd Hudiburg	111	31.42	7,956
Richard D. Hohlbauch	35	30.81	7,949
J. C. & H. H. Lewis	3	29.60	7,945
Tavares & Teore	88	31.03	7,944
D. Lapenta & Co.	75	27.69	7,936
Hanson & Fortune	42	30.20	7,924
Donald M. K. Au	17	29.85	7,916
Bob Cauzza	62	29.68	7,907
Kenmar Farms	35	28.51	7,857
S. E. Lowrance Ranch	100	26.35	7,852
Clarklind Farms	53	31.71	7,801
Arthur J. Cuelho	99	28.77	7,797
Robert Cardwell	24	29.22	7,796
Kern County Land Co.	78	30.81	7,789
John B. Cauzza	65	29.07	7,785
E. J. d'Artenay	42	27.53	7,780
Garvin H. White	37	27.75	7,770
Albert J. & Kenneth A. Perry	8	25.32	7,728
Joe G. Fanucchi & Sons	30	32.88	7,727
Joe G. Fanucchi & Sons	38	31.96	7,722
Kenmar Farms	50	37.19	7,721
BTV Farms	64	28.15	7,713
Britz Chemical Co., Inc.	93	30.16	7,697
Crettol Farms	38	28.51	7,681
Bonanza Farms	182	26.57	7,679
Albert J. & Kenneth A. Perry	11	26.57	7,679
Vista Farms	38	26.03	7,637
L. L. C. Cardoza	15	29.69	7,636
Tracy Ranch, Inc.	39	31.33	7,607
Wm. Erickson	100	27.59	7,598
Airway Farms, Inc.	100	26.48	7,589
Arthur J. Cuelho	177	25.49	7,550
Mitchellinda Ranches, Inc.	10	33.76	7,549
Fred Garrison	62	26.04	7,520
Harris & Harris Farms	42	32.98	7,506
W. M. & D. L. Colson	21	28.91	7,488
W. L. Simmons	61	28.49	7,487
Carl C. Gunlund	36	27.78	7,478
Richard D. Hohlbauch	44	27.15	7,461
Dillon Bros.	17	29.12	7,426
P. A. Walls	86	27.70	7,424
Eckhardt Tripple	18	27.95	7,424
Dillon Bros.	83	29.04	7,417
Double L. Farms	38	28.39	7,415
W. P. Romero	38	31.81	7,393
Giusti Farms, Inc.	70	27.09	7,385
John D. Mederos	42	28.77	7,382
Harold O'Banion	30	33.73	7,367
Costerisan Farms	30	36.27	7,363
George Bassett, Jr.	31	28.09	7,343
Kenmar Farms	139	27.17	7,336
Elmer Suorez	67	31.75	7,334
G. E. Paxton	38	31.88	7,326
Garlow Brothers	157	26.70	7,321
Coalinga School Farm	5	27.98	7,320
Kenneth Peelman	25	28.20	7,315
Bob Cauzza	124	29.70	7,306
Newhall Land & Farming Co.	58	27.25	7,298
Hank Anderson	10	26.14	7,288
Floyd Hudiburg	35	27.85	7,286
Mose Maggard	10	28.47	7,271
Del Testa Farms	35	28.62	7,264
Kern County Land Co.	175	28.62	7,247
Walter Willms	46	26.07	7,247
Southlake Farms, Inc.	100	30.11	7,232
Mitchellinda Ranches, Inc.	30	28.53	7,212
D. T. Locke	100	25.07	7,210
E. L. Goodspeed	21	27.54	7,193
Dutra Bros.	4	28.97	7,185
Elo & Vido Fabbri	54	28.37	7,178
David Noel	18	27.14	7,176

Grower	Acres Harvested	Tons Per Acre	Lbs. Sugar Per Acre
Wedderburn Bros.	78	25.83	7,155
J. G. Boswell Co.	230	28.81	7,093
Pomeroy & Jewett	114	26.72	7,065
Sherman A. Cave	61	24.97	7,062
Frick Brothers	279	28.29	7,061
Dick Anderson	36	27.41	7,061
James W. Kalpakoff	35	28.50	7,051
Robert Cardwell	68	26.38	6,975
Manuel Garcia	18	31.09	6,970
Miller & Lux, Inc.	103	27.78	6,956
Fanucchi Brothers	32	27.57	6,948
Severin Sandrini & Wahl	45	28.50	6,943
Joe G. Fanucchi & Sons	88	26.23	6,914
Merz Farms, Inc.	73	28.80	6,912
Barnard Brothers	73	29.61	6,911
Clarklind Farms	53	26.54	6,900
Robert S. Dickson	6	31.08	6,894
G. P. Orisio	37	26.46	6,864
SPM Farms	17	27.28	6,864
Miller & Lux, Inc.	114	30.13	6,852
Rio Vista Farming Co., Inc.	41	27.29	6,850
Jensen Farms	141	26.61	6,849
Davis Bros.	19	25.00	6,835
Frank C. Diener Ranch	178	25.76	6,826
Margaret Michels	45	27.70	6,825
Bob Cauzza	50	28.48	6,824
Stanley Hefner	16	29.83	6,813
Jake Kroeker Sons	26	28.56	6,809
Westlake Farms, Inc.	349	25.50	6,809
Joe G. Fanucchi & Sons	131	27.15	6,804
Manuel Garcia	4	34.14	6,801
Roy Henson & Sons	66	26.42	6,790
Double L Farms	174	27.66	6,788
Lee Herring	60	27.04	6,787
Clay Thurman & Percy Smart	93	25.59	6,776
Destefani Bros.	81	25.86	6,775
Costerisan Farms	90	31.16	6,749
Frank A. Steiner	39	25.14	6,743
Joe G. Fanucchi & Sons	81	27.27	6,730
Lone Palm Farms	67	27.11	6,702
Tom Toreeta	37	26.83	6,702
Rio Vista Farming Co., Inc.	289	26.91	6,695
Parish Brothers	8	25.59	6,684
Joe Garone	49	26.58	6,672
Martin Costales	50	25.95	6,669
J. W. McBee	39	27.65	6,669
Walter Jalonen	153	26.11	6,668
Robert M. Taggart	51	26.71	6,656
Houchin Bros. Farming Co.	229	25.27	6,641
W. R. Greenlee	78	25.23	6,635
C. E. & R. B. Klepper	68	25.48	6,610
Mike C. Garone & Son	40	27.75	6,571
S. A. Camp Farms Co.	368	27.30	6,568
F. W. Handel Farming	122	26.57	6,552
G. E. Paxton	29	27.18	6,550
W. M. & D. L. Colson	44	25.10	6,546
Dick Anderson	38	26.19	6,542
A. H. Wegis & Sons	87	27.08	6,526
M. Hase	18	25.24	6,522
S. E. Brown	38	25.33	6,520
Kenneth Peelman	70	25.76	6,502
Palm Farms, Inc.	109	26.95	6,490
Parsons Ranch	38	25.22	6,466
Dudley & Oliver Farms	25	26.87	6,460
Frank J. Freitas	35	25.13	6,408
Derby Farms	63	26.11	6,407
Parish Brothers	19	26.31	6,404
Banducci Farming Co., Inc.	158	25.94	6,397
Destefani Bros.	44	25.40	6,360
Mason Snow	65	25.75	6,329
Correia Bros.	26	26.12	6,311
Double L Farms	26	29.09	6,307
Leon H. Ollivier	33	26.68	6,291
J. E. Gossiaux	155	25.29	6,277
Pryse Farms, Inc.	20	25.41	6,225
McCarthy-Hildebrand	297	26.90	6,182
Marvin A. Lane	40	25.94	6,179
Nagel Brothers	65	26.57	6,143
Tavares & Teore	12	25.10	6,139
Nichols Farms	72	25.57	6,127
L. A. Grant & Sons	224	25.51	6,117
Calflax Co.	132	25.22	6,108
Roy C. Mills & Son	20	25.34	6,092
A. Lobue Farms	44	25.50	6,079
Earl Royer	60	27.01	6,056
Jake Kroeker Sons	34	24.99	6,038
Destefani Bros.	70	30.29	6,028
Richard & Donald McCarthy	100	25.27	5,868
Amerigo Sandrini	37	24.99	5,968
Double L Farms	34	25.13	5,931
Marvin A. Lane	72	25.44	5,912
Kern County Land Co.	353	25.33	5,821
R. A. Hildebrand	100	25.28	5,476

FACTORY 5 PROGRESS REPORT

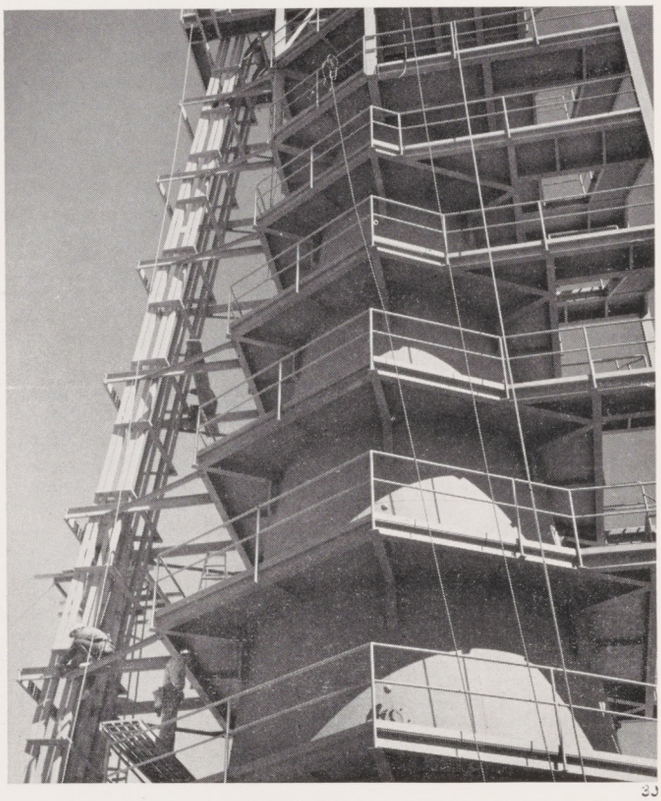
CONSTRUCTION AT THE Chandler, Arizona factory site continues to move forward, and as of mid-April, the new facility was 75 per cent completed, and just one year away from production.

With all of the major buildings and structures completed, and about two-thirds of the hundreds of pieces of sugar manufacturing equipment in position, major emphasis now centers on installation of the piping to connect one processing component with another. Electrical wiring and installation of motors and pumps are being accomplished at the same time.

The next major undertaking for the construction crew will be the critical job of instrumentation, wherein over 900 miles of wiring will be connected to the hundreds of dials, gauges and recorders scattered throughout the plant. Ultimately, a central control room will monitor every mechanical function at the site.

Equipment currently being installed at the Spreckels plant includes machinery and parts from all over the free world. Much of the specialized sugar making equipment is not available in Arizona or even the United States for that matter — pulp presses from Norway and specially designed nozzles from Germany, for example. Such items as Alabama manufactured vacuum pans, slicers from Utah, filters from Los Angeles and Salt Lake City, centrifugals from Ohio and steam equipment from Pennsylvania are currently arriving or being installed.

Currently over 250 men, representing nearly every conceivable building trade, are on the job working toward a schedule that will see Arizona grown sugar beets processed into sugar beginning next April.



Not a Chinese pagoda, but the new lime kiln at Factory 5.

C.B.G.A. LTD. PRESENTS FOUR SPRING MECHANIZATION FIELD DAYS

COOPERATING WITH THE University of California Agricultural Extension Service, California Beet Growers Association, Ltd. has conducted four field days to acquaint California beet growers with latest machines and methods for reducing Spring labor needs.

The first of the events was held at the Woodland Fair Grounds on March 16. Albert Orth, C.B.G.A. president, District 4, conducted the luncheon meeting, at which illustrated talks were presented by:

Dr. Robert Loomis, University of California, Davis

Dr. Varon Jensen, Spreckels Sugar Company

Curzon Kay, American Crystal Sugar Company

Ned Frandeen, Amchem Products, Inc.

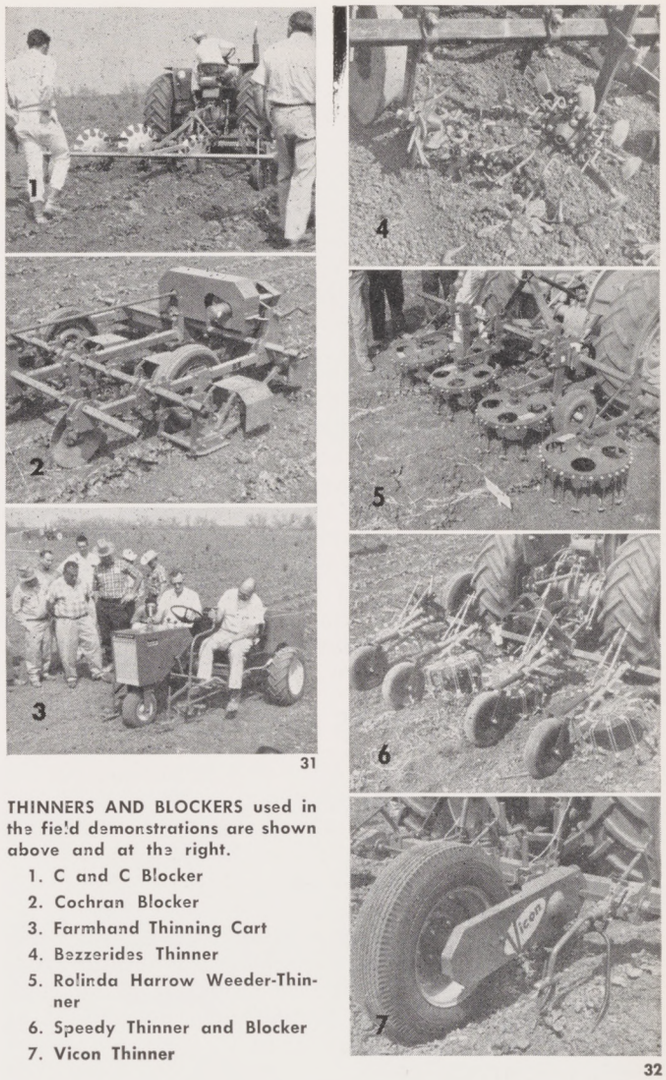
N. F. Hardman, Stauffer Chemical Company

An extensive display of planting, thinning and cultivating equipment exhibited the products of 24 manufacturers — testimony to the widespread interest in Spring mechanization.

On March 29, growers had an opportunity to see many of these tools demonstrated in the field. Two demonstrations were held; at Helm and at Tulare. Fresno and Tulare County Farm Advisors provided expert management of these programs.

A similar field demonstration was presented on May 25 by District No. 2, California Beet Growers Association, Ltd. This was held on the Herman Ehler & Sons Ranch near Stockton.

A list of the machines shown at the Woodland machinery exhibit is given on page 24.



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THINNERS AND BLOCKERS used in the field demonstrations are shown above and at the right.

1. C and C Blocker
2. Cochran Blocker
3. Farmhand Thinning Cart
4. Bezzerides Thinner
5. Rolinda Harrow Weeder-Thinner
6. Speedy Thinner and Blocker
7. Vicon Thinner



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THE WOODLAND MACHINERY EXHIBIT



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THE DEMONSTRATION AT HELM

THE CHANGING HARVESTER PICTURE

By AUSTIN ARMER, Agricultural Engineer
Spreckels Sugar Company

ANYONE SHOPPING for sugar beet harvesting machinery in anticipation of the 1966 Fall harvest will find some changes — both in the way the 1966 harvesters are built, and in who builds them.

To the credit of the machinery makers there is a marked emphasis on delivering cleaner beets. All of the lifter-loaders which have been redesigned for 1966 offer improved means for dirt and trash elimination. It should also be mentioned that the advanced experimental models tested during the spring harvest showed that dirt and trash removal are of prime concern to their designers.

Perhaps next in emphasis is improved beet recovery. Semi-automatic steering is now available on most machines, employing hydraulic sensing and steering mechanisms. This awareness of keeping harvesters accurately on the row stems from the evidence that the main cause of field losses (broken or missed beets) is failure of the lifting element to be centered on the row.

NEW NAMES AND PLACES

Allis-Chalmers appears for the first time on the name plates of a well-rounded line of toppers and loaders. The machines are being built by Oppel Harvesters, Inc. A new 17-acre factory site accommodates their expanded production facilities at Meridian, Idaho.

Farmhand toppers and lifter-loaders, formerly built by Oppel and distributed by Farmhand Division of Daffin Corporation at Hopkins, Minnesota, are now being built at Farmhand's own plant at Greely, Colorado.

IMPROVEMENTS AND REFINEMENTS

The Allis-Chalmers Model 424 three-row lifter-loader presents some noteworthy innovations. The partially cleaned beets are elevated vertically by a pair of "hugger" potato chains, and enter a long horizontal nip-roll screen, thence to a delivery conveyor of the potato chain type. Screenings from the nip rolls fall by gravity over an apron to the rear of the machine.

The general configuration of the A. C. Model 424 is reminiscent of the harvester designed in 1962 by Spreckels grower Bill Sousa of Manteca (Spreckels Sugar Beet Bulletin, Vol. 28, No. 2, 1964).

Blackwelder Manufacturing Co. has made a number of refinements in their current production of single and double row beet harvesters. A height-sensitive row-finder embodies two sensing feelers attached to valves controlling a steering cylinder. Stripper blades are now hardfaced with tungsten carbide, and a newly designed pickup wheel lift arm improves the pickup wheel drive mechanism.

Hesston Mfg. Co. offers a new top-windrowing disk topper for up to six rows (Model 40), and will soon be in production of a three-row direct loader featuring exceptional beet cleaning ability and high production. They will continue production of their tank type harvesters (2-row Model 520 and 3-row Model 540) as well as direct loaders (2-3 row Model 390 and 3-4 row Model 480).

Some of the improvements and refinements are illustrated in the protographs which follow.

ALLIS-CHALMERS



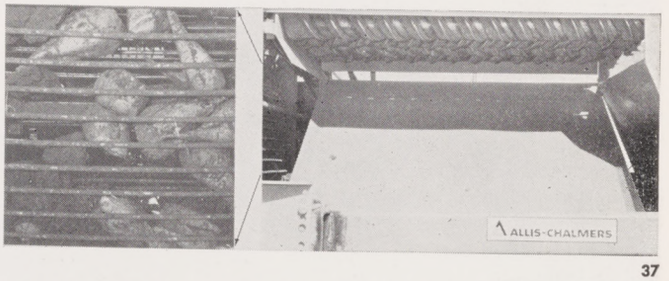
A-C Photo 35

ALLIS-CHALMERS Model 350 two-row tank type lifter-loader.



A-C Photo 35

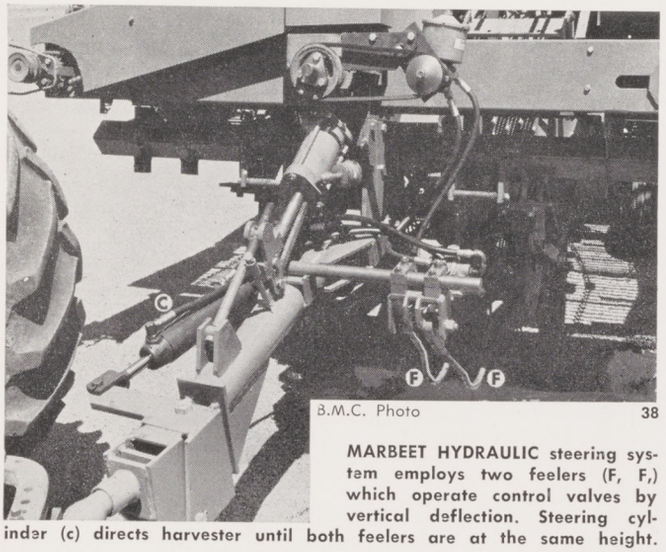
ALLIS-CHALMERS Model 424 three-row direct loader.



37

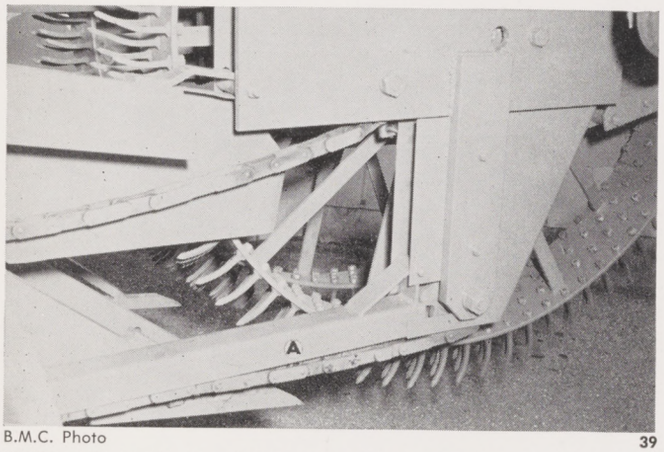
IN THE MODEL 424, beets are elevated vertically (left) to a large nip-roll screen (right). Screenings fall by gravity to the rear of the machine over a steeply sloped apron.

BLACKWELDER MFG. COMPANY (MARBEET HARVESTERS)



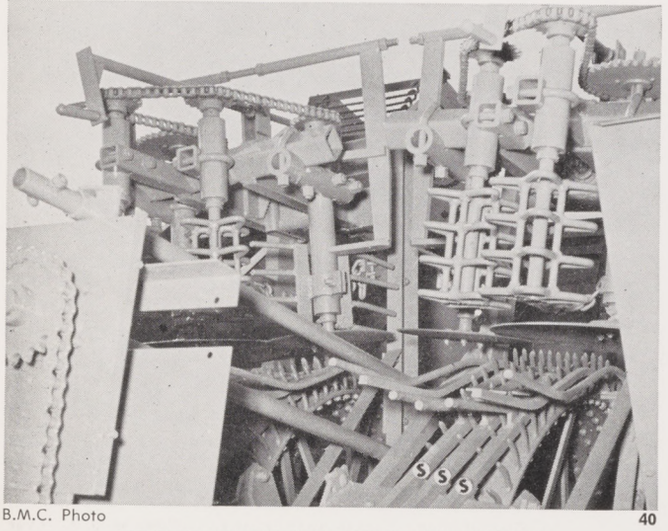
B.M.C. Photo 38

MARBEET HYDRAULIC steering system employs two feelers (F, F,) which operate control valves by vertical deflection. Steering cylinder (c) directs harvester until both feelers are at the same height.



B.M.C. Photo 39

PICKUP WHEEL Lift Arm (A) improves drive mechanism of spike wheel.

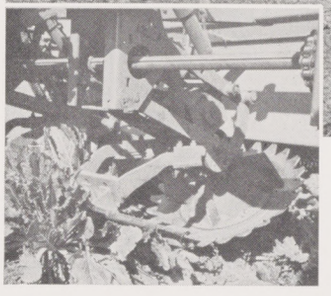


B.M.C. Photo 40

STRIPPER BLADES ARE NOW hardfaced (S,S,S,)

HESSTON MFG. COMPANY





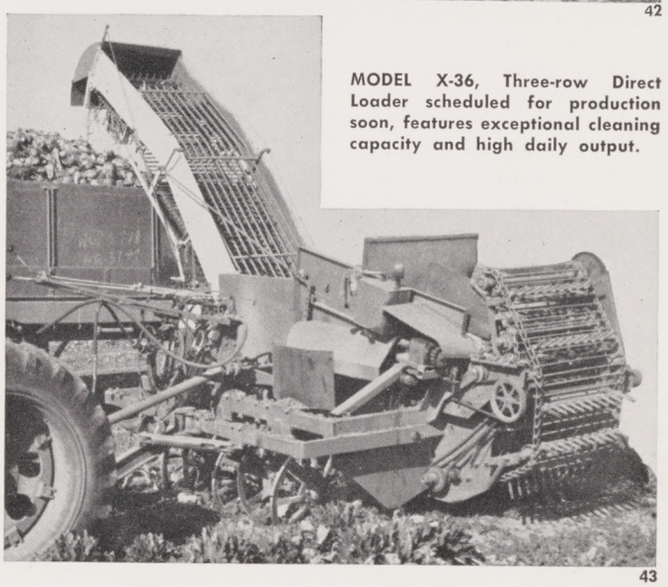
41

HESSTON Model 40 3-row disk topper has hydraulically controlled conveyor (C, above) which windrows up to six rows of tops. High speed notched topping disk (Insert left) has bell-type hub, permitting rapid drop from high to low beet.

MODEL 480 Direct Loader lifts, cleans and delivers four rows of beets in normal yields; three rows in exceptionally high yields or trashy, cloddy fields.



42

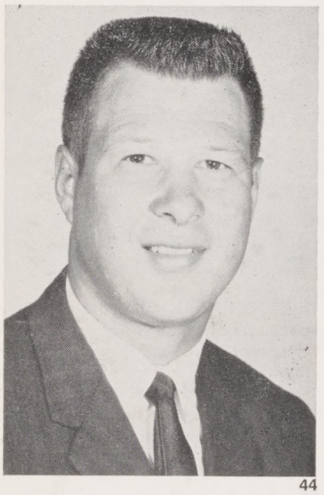


MODEL X-36, Three-row Direct Loader scheduled for production soon, features exceptional cleaning capacity and high daily output.

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Notes from Our Field Men

MARSHALL PYLMAN — Stratford



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There was an interesting article in the October, 1965 issue of *California Agriculture*, published by the University of California, on irrigation pumping lifts in the San Joaquin Valley. It grouped areas according to well depth and other related items of interest, and gave a good idea of depths and cost per acre foot in districts located in the valley. The northern areas of District #4 (Mendota Factory) are represented in this table:

Area	Input H.P.	GPM	Pumping Lift (Ft)	Ave. Change in Pump Lift 1950-54 to 1960-64 (Ft)	Est. Cost Per Acre-Foot
Los Banos — Dos Palos	45	1,554	32	+25.0	$ 1.54
Mendota — (South & West)	187	1,178	327	—41.0	14.39
Fresno — Kerman	33	755	72	—7.6	3.33
San Joaquin — Helm	82	1,309	118	—5.3	5.55
Five Points (South)	203	1,240	365	—52.2	16.43
Visalia	15	458	40	+10.6	2.32
Hanford — Stratford	98	1,109	160	—13.0	9.60
Lemoore — Tulare Lake Coalinga — Kettleman City	101	785	235	—34.3	10.58

EXHIBITS AT WOODLAND

Continued from page 21

LAND PREPARATION TOOLS
Howard Rotovator
John Deere Sled
Johnson Plantivator
K-C Sled
Marvin Sled Incorporator
Massey-Ferguson Sled
Ohrendorff Sled

PLANTERS
John Deere
International
Milton
Stanhay
Ventura

THINNERS, BLOCKERS
Bezzerides (Planet Jr.) Thinner
Blackwelder Thinner and Blocker
Cochran Blocker
Farmhand Thinner
Harriman Rotoweeder
Rolinda Harrow Weeder-Thinner
Speedy Thinner and Blocker
Vicon Thinner

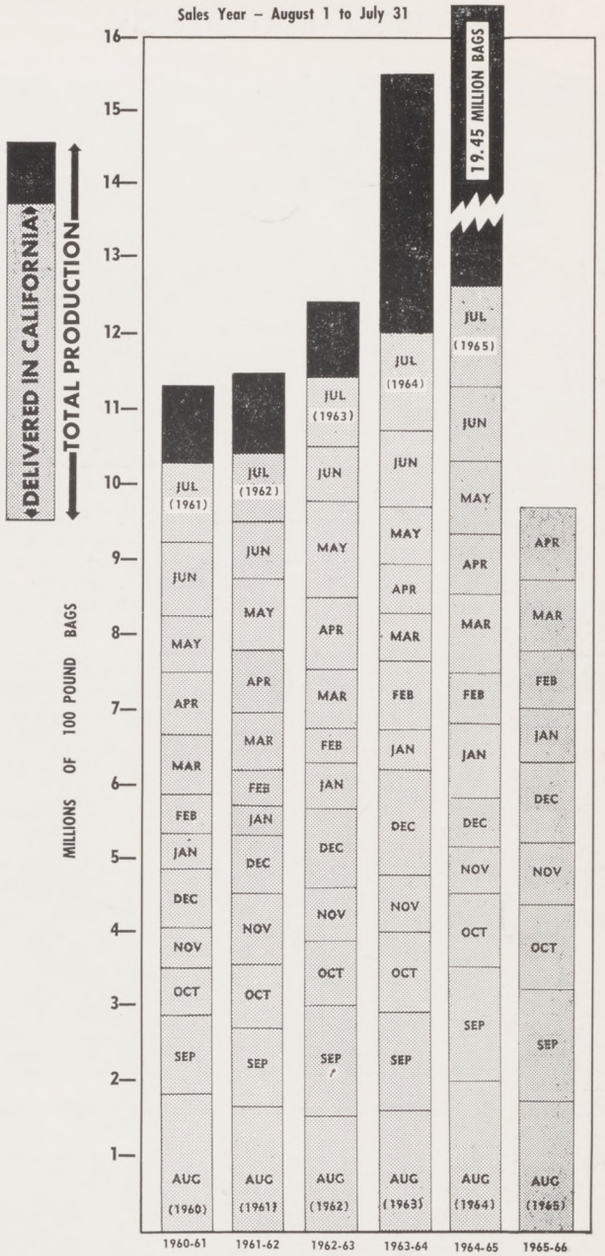
CULTIVATORS
Bezzerides Spyder Wheel Cultivator
Buddingh Wheelhoe
Byehoe
Ferguson Till-r-vator
Lilliston Rolling Cultivator
Sidewinder Cultivator

SPRECKELS SUGAR BEET BULLETIN is issued quarterly by the Agricultural Department of Spreckels Sugar Company as a service to its growers. Mention of specific methods, devices and implements does not constitute an endorsement by the Company. All photographs by the editor unless otherwise indicated.

AUSTIN ARMER, EDITOR
SPRECKELS SUGAR COMPANY WOODLAND, CALIFORNIA

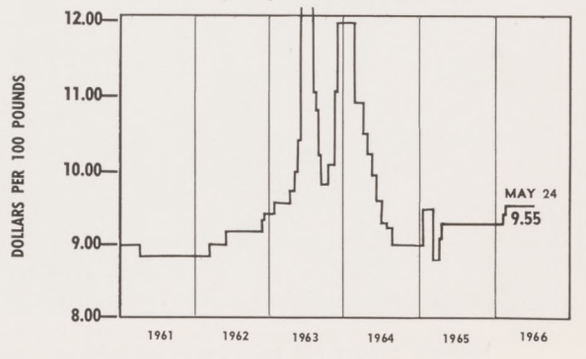
PRODUCTION AND DELIVERIES OF BEET SUGAR

Sales Year – August 1 to July 31



QUOTED PRICE OF BEET GRANULATED SUGAR

In 100 Lb. Paper Bags, F.O.B. San Francisco



45

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PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

SPRECKELS SUGAR BEET BULLETIN

VOL. 30 FALL, 1966 NO. 3



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BIG BUSINESS

Transporting sugar beets to Spreckels factories each year costs 4½ million dollars. Railroad and truck lines have a tremendous investment in specialized beet hauling equipment, and perform a notable service in keeping factories supplied with beets.

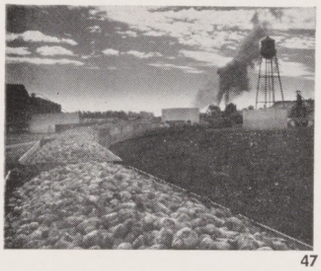
HARVEST PLANNING AND SUGAR BEET TRANSPORT

By MELVIN H. VOOS,
Assistant to Agricultural Manager
Spreckels Sugar Company

THE ANNUAL TASK of harvesting, receiving and transporting nearly 3 million tons of sugar beets for processing is one requiring considerable planning, cooperation and almost daily re-evaluation. From the factory manager, who must plan maintenance schedules to ready his equipment for processing, to the grower, who must coordinate his cultural operations, irrigation, and harvest plans with his field representative, scheduling is a matter of direct concern. It is the goal of all these persons to harvest, haul, receive, ship, unload and process the crop as economically as possible.

The agricultural staff must provide a continuous and uniform supply of beets to meet the exact slice requirements of each operating factory. This supply must be maintained at the highest beet quality available which, in turn, requires that transit time must be short and inventories at factories must be minimal. Timely factory starts become most important in order that the crop in a given area can be harvested under the best yield and quality conditions that can be provided. Timing, therefore, becomes an important factor in optimum plant operations and in returns to the grower. Factory start-up schedules are predicated on the acreage to be harvested, yield estimates, modernization and factory maintenance requirements, factory location, beet transport costs, etc. During the harvest operations, conditions often change, requiring adjustments or alterations in harvest schedules and factory operation periods. Such adjustments are often the result of adverse weather (which may affect yield and quality, or ability to harvest), pest infestations, disease conditions, yield increases, factory operational difficulties, transportation availability and receiving facility capacity, to name only a few. Such factors influencing sugar beet distribution require constant reappraisal to make changes that cause the least dislocation of supply and a minimum discomfort to growers.

Often situations arise which cause individual growers hardships. Unavoidable breakdowns, car shortages and bumper crops are all factors which contribute to delays which, in turn, require harvest plan adjustments. No single alternative will meet everyone's approval. Accordingly, it is necessary to decide on procedures which will maintain factory supply, orderly shipments of beets and as rapid a harvest as can be processed based primarily on area considerations rather than upon individuals.



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COVER COMMENT — Another campaign day dawns at Factory 3, Woodland, as a trainload of sugar beets arrives. Rail transport of sugar beets from the company's 35 receiving stations supplies the factories with a large share of their beets — direct grower deliveries and contract trucker deliveries make up the remainder.

HARVEST PATTERN

The general pattern of harvest in recent years begins in our most southern growing region, Kern County. Operations normally commence in early July and continue at a relatively high volume in order to harvest and process the crop before the occurence of a rapid decline in sucrose content and beet quality which is associated with the high mid-summer temperatures common to this area. Because of the great distances involved nearly all of the beets in the South San Joaquin Valley are loaded at railroad receiving facilities into beet gondolas for transportation to the factories. Naturally, the nearest facility at Mendota is the first to begin processing. If the early crop is sufficient to permit the operation of all factories before mid-July, as many as 200 cars per day may be required.



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SOUTHERN PACIFIC Company has 1500 of these 70 ton high-side beet gondolas in service.

This peak demand for daily rail service by our company often coincides with a period of high car usage by other California beet sugar companies in processing the last of the Imperial Valley crop. Under these conditions and assuming a daily total requirement of 300 cars (Spreckels 200, other processors 100) multiplied by a 5 day turn-around factor, it is readily apparent that the entire Southern Pacific fleet of approximately 1,500 beet gondolas is needed in service without any allowances for missed freight schedules, bad order cars, etc. Daily communication and cooperation with Southern Pacific is essential to achieve the maximum efficiency in car loading and train movement. With reduced tonnage for 1966 crop, the South San Joaquin accounted for about 110 car loadings per day during early July this year.

By mid-July harvest expands to Kings and Tulare Counties and the western portion of Fresno County. The location of receiving stations, being much nearer Mendota, permits the use of transport trucks and their more rapid delivery of beets to the mill. Whenever distance permits, transport trucks are preferred to rail cars because of their obvious advantages in reducing transit time and the need for maintaining wasteful inventories of beets at the

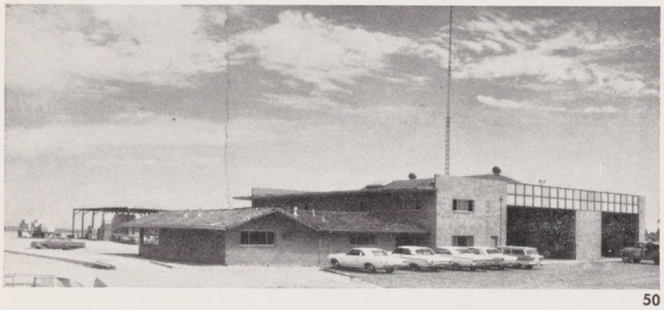
factories. When the distance exceeds 60 to 70 miles it is normally necessary to resort to rail delivery; however, on occasions where speed is essential to maintain a factory in operation, trucks have been used for distances of over 100 miles. Transportation rates per ton are generally lower on transport trucks for short distances, but rail costs are lower on the high volume, long hauls.

Gradually the harvest moves north and east throughout the San Joaquin Valley into other areas of Tulare, Fresno, and Merced Counties. As harvest volume increases processing capacity is increased concurrently by bringing into operation additional factories. In recent years of record high acreages, all four of our California factories have been in operation at this point with a combined slicing ability of approximately 17,000 tons of beets per day. It is not necessary to have an intimate understanding of the problem to appreciate the tremendous demands placed upon harvesting, receiving and transporting equipment in supplying the raw product to these factories.



Tidyman Studios 49

GEORGE PEARCE maintains and dispatches this fleet of sugar beet transports at Factory 4, Manteca.



50

RALPH PANELLA'S fleet of sugar beet transport trucks is serviced at and dispatched from this new headquarters near Factory 3 at Woodland.

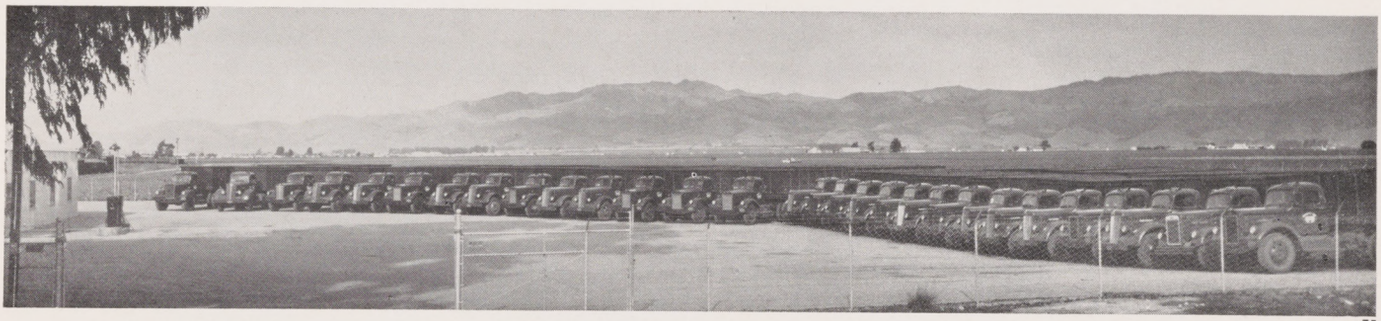
In early September some local harvest in all factory districts has normally started and these beets will replace beets from the South San Joaquin. At this point the extreme southern area of the San Joaquin is nearing completion. Local factory harvest in the Sacramento, North San Joaquin and Coastal Valleys builds rapidly, and by the end of September all factories are operating essentially on local district beets. During the remainder of the fall harvest, from mid-September to mid-November, there exists little movement of beets between districts and all factories operate essentially on short haul transport trucks and farmer-hauled beets. Early rains in one district or another may change this pattern over night, and beets from a district where harvest continues are transported to a factory where local harvest may be "rained-out". Efforts to maintain continuous factory operation by importing beets must then continue until such time as harvest resumes. However, because of less acreage in the coastal valleys this year, it will be necessary to process interior valley tonnage at the Salinas Valley factory during the late fall. In all probability some small supply for this factory will continue most of the fall with heavy shipments after early November. Hopefully, weather conditions this year will permit a long fall campaign thereby reducing the number of operating days required next spring.

The spring campaign, subject to early weather interruptions, often experiences a rather sporadic beginning. As spring showers subside and ground dries out, factory operation begins as soon as local harvest can adequately support the daily slice requirements. Then, as harvest volume justifies, shipments to the Salinas factory starts, which requires a train of 100 beet cars daily to sustain its operation.

1966 CROP PLANS

This year, 1966 crop, the Mendota and Woodland factories started operations within a few days of one another in early July. The Manteca factory started about August 1. As this article goes to press, the Salinas factory has steam up and will

(*Continued on page 36*)



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NEAR FACTORY 1, at Spreckels, Giacomazzi Brothers Transportation Company maintains its shops and dispatching offices.

BEET RECEIVING STATIONS DESIGNED TO SERVE GROWERS

By AUSTIN ARMER, Agricultural Engineer
Spreckels Sugar Company

THE THEME of this issue of the BULLETIN is sugar beet transport. It is fitting, therefore, to discuss the contributions made by receiving facilities to the general subject of moving beets from field to factory.

When Claus Spreckels built his first factory at Watsonville in 1887, it was supplied by beets grown within wagon-hauling distance of the factory. As acreage expanded, the first railroad loading station (within this author's knowledge) was erected on the Southern Pacific line between Watsonville and San Juan Bautista, and appropriately named "Betabel."

By the '90s, rail transport of sugar beet was firmly established. Claus Spreckels' narrow gauge line — the Pajaro Valley Central — hauled beets to Watsonville from Blanco and Moro Cojo in the Salinas Valley. In Southern California, rail-hauled beets came to the factories at Chino, Los Alamitos and Oxnard.

As receiving stations (quite properly called beet dumps) became increasingly essential to beet transport, their design became the work of specialists. The first specialist of record was Timothy Carroll, and the following quotation from Dan Gutleben's authoritative "Sugar Tramp" is interesting.

"Tim Carroll, the major domo of Anaheim, was in Chino Tuesday bringing with him his patent wagon and car dump. The dump has been in successful operation in Anaheim, Buena Park and Los Alamitos. It consists of a raised tilting platform with inclined approaches. The wagon or car is run upon the platform to which it is quickly anchored. The side of the wagon or car is hinged at the bottom and secured at the top. As soon as the vehicle is in place and fastened, the platform is tilted. At the same time the side is released and swings down dumping the load instantly. Tim thinks he has a bonanza in the invention and it undoubtedly is of great economic value where heavy loads must be dumped quickly."

Carroll did indeed have a bonanza. The courts upheld his patent and for some years he collected a royalty of 1 cent per ton of beets from sugar processors from California to Colorado.

But other names made their appearance as beet dump specialists: Tuttle, Joehnck, Hartburg, Rienks, and the half-brothers James and Harold Silver — to name just a few.

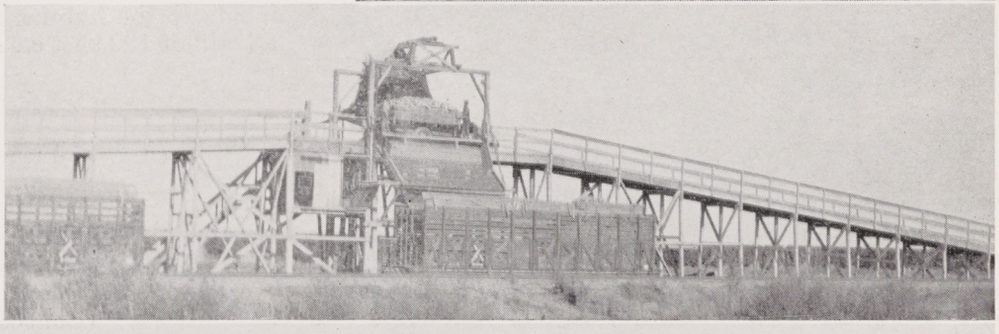
Since the 1930's, the dominant manufacturers of both beet dumps and beet pilers were Ogden Iron Works, founded by the late James Silver, and Silver Engineering Works, Inc. of Denver, founded by Harold Silver.

BELOW — BEFORE 1920, the very latest mode of beet transport was the A-frame wagon. It had a 6-ton capacity and cost $175.00 (not including motive power).

Photographer Unknown 52



RIGHT-IN 1924 this modified Carroll beet dump could dump 4 tons of beets from a Kleiber or Moreland truck, and would receive 80 tons of beets in a day.
Photo by S. E. Miller



BELOW — THE BOLSA receiving station is the most recent Spreckels designed station. It accommodates trucks hauling up to 24 tons of beets, and can receive 1800 or more tons of beets daily.



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MACHINE HARVEST CHANGES PICTURE

Mechanical beet harvesting in California started in the early 1940's, and by 1946 it became evident that beets harvested by machine presented a number of problems at the receiving station. These beets, being fresh from the field, were far more brittle than hand-topped and loaded beets. Early harvesting machinery tended to break off beet tails, and the beets would roll back on the steep conveyor belts on existing stations.

Worst of all problems was the volume of dirt and trash delivered by the harvesting machines. In 1946 this problem demanded solution and this writer embarked on a development program which ultimately led to the nip-roll screens which are now in service at all Spreckels receiving stations, including those at the factories.

In 1957, Spreckels Sugar Company built at Del Paso the prototype of all of its subsequent stations. Designed by this writer, the Del Paso station combined the functions of beet hopper feeder belt and inclined elevator belt into a single, wide slow-moving belt, delivering beets to a nip roll screen. After being cleaned the beets are delivered by a gently inclined belt to rail cars, or optionally to transport trucks. This new design was covered by U.S. Patients, No's 2,604,206 and 2,997,086. Receiving stations built since 1958 have been erected by Spreckels Agricultural Department engineering and construction personnel, using components fabricated to specifications at local shops near the sites, whereever possible.

PERFORMANCE OF MODERN RECEIVING STATIONS

Present day receiving facilities of Spreckels Sugar Company can accommodate the largest legal truck loads of beets, since 70 foot truck scales are now in general use. The delivery rate of the conveyors is on the order of six tons per minute, so that only two minutes are needed to dump the largest beet box. If it were possible to maintain uninterrupted operation, the rail receiving stations would handle 2880 tons in an 8 hour day. But cars have to be moved, and there are inevitable delays in moving and hooking up beet trucks so that a normal day's work is about 1800 tons or 25 car loads of 70 tons each.

The factory receiving stations are much larger than the outside stations, and have about double the daily capacity. (The nip roll screens at the Mendota and Chandler factories are the world's largest, as far as is known).

Where deliveries of beets are at a low rate from small acreages, or where receiving facilities are of a temporary nature, beet pilers are used.

RECEIVING STATION MAINTENANCE AND SERVICE

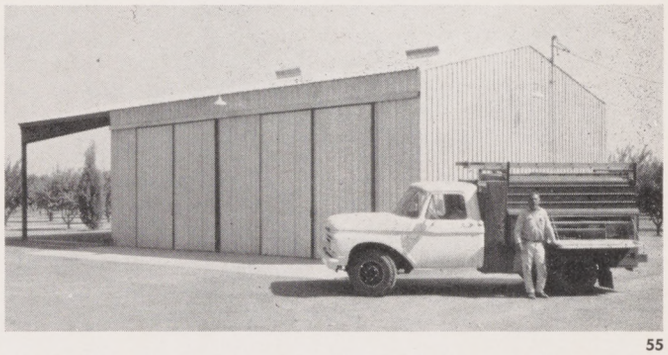
The machinery at a receiving station operates under conditions about as adverse as could be

(*Continued on next page*)



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THE DISTRICT 1 Agricultural Maintenance and Construction crew and facilities. Sample trucks are the two on the right. Tom Ryan, District Engineer, is third from right.



55

AT MANTECA, Cornelius Jensen and his service shop and truck. A sample truck is also stationed here.



56

AT WOODLAND, the agricultural shops were expanded in August. District Engineer Glenn Hubbard (L) and R. G. Hendricks supervised construction.



57

THE MENDOTA agricultural service center is headquarters for John O. Nielsen, District Engineer, with his service crew and fleet of service and sample trucks.

imagined. Bearings, chains, and sprockets function in a virtual bath of sifting dirt; delicate truck and dirt scale mechanisms must, by law, be accurate to less than 1/10% while operating in blinding clouds of dust.

In spite of these adversities, mechanical failures must be made virtually impossible, since the cost of down-time is enormous in terms of receiving and shipping delays, not to mention emergency repairs. Consequently, receiving station maintenance is based on the "Ounce of Prevention" philosophy.

During inter-campaign shut-down, each receiving station undergoes close inspection and replacement of all parts showing wear which might cause failure within the season. Elaborate lubrication schedules are maintained before and during operation. Each district is headquarters for crews of skilled mechanics and welders, equipped with a total of 18 service trucks — every one a mobile shop.

An additional important but seldom seen receiving station operation is transporting growers' beet samples from each of 35 stations. In most cases, samples are collected from the stations after closing hours, and rushed to the nearest tare laboratory (these are located at Spreckels, Bakersfield and Woodland). The tare laboratories determine dirt and crown tare and sugar percentage for all beets delivered by growers, and generally operate between the hours of midnight and eight a.m.

To move all these samples, a fleet of 6 trucks is in operation.

DIRT DISPOSAL

The foreign matter which accompanies most loads of beets consists of soil adhering to beets, loose soil, clods, weeds and beet foliage. (Occasional loads contain an astonishing assortment of rocks, truck and tractor parts, bottles, cans and about anything that can be named from anti-aircraft projectiles to bones of prehistoric Indians.) Dirt removal is the function of the cleaning screens; dirt disposal is accomplished by an impressive fleet of dump trucks (totalling 44 in all four districts).



ABOVE — Three heavy-duty spreader beds on four-wheel drive trucks handle tare dirt from the Manteca receiving station.
LEFT — Contrast this one horsepower two wheel tare cart with the above. It was in service at Spreckels Ranch II near Greenfield, in 1918.

The amount of dirt which accompanies beets is of serious concern to both grower and processor. The percentage of dirt removed by the screens varies widely — exceptionally clean loads yielding 1% dirt, while occasional loads during harvest in wet ground exceed 40%. A median value would be on the order of 6%.

Since three million tons of *clean* beets were received by Spreckels Sugar Company in 1965, it is evident that some 240,000 tons of dirt were removed from the fields, hauled at grower expense. Perhaps the most serious aspect of this huge earth moving project is the loss of priceless topsoil; 240,000 tons of soil represents some 120 acre feet. In other words, the cream of 120 acres of prime farm land was skimmed off and lost to production.

But that is not all. The screens remove loose dirt and trash, but cannot remove large clods or weed clumps. These find their way into factory flumes where they are partly dissolved and partly removed by mechanical means. In the aggregate, this foreign matter amounts to about 2% on clean beet weight. Together with the screenings, the Company must therefore dispose of dirt and trash amounting to approximately 8% of all the beets purchased.

Growers must and can do something about this. Harvesters and harvester adjustment are the point of attack. The worst offender is the old direct loading lifter, with no cleaning ability except that provided by a few Rienks rolls. Almost as bad is the tank type lifter-loader without a nip-roll screen. But lifter-loaders *with* nip roll screens, and also Marbeet harvesters, are the least offensive types in terms of dirt delivery.

By taking care to use only harvesters thus properly chosen and adjusted, growers can make a substantial contribution toward reducing the overall cost of sugar beet transport — and especially that part which comes out of their own pockets.

CALIFORNIA WEED CONFERENCE AT SAN DIEGO IN JANUARY, 1967

THE CALIFORNIA WEED CONFERENCE, to be held at the Hilton Inn, San Diego, January 24-26, 1967 promises to be a meeting with a broader coverage of subject matter than any previous conference.

The program committee has already recruited a panel of speakers who are acknowledged to be authorities in the fields of agriculture, industrial, irrigation and turf weed control. In addition, top men in research are being scheduled. The meeting will be of interest to everyone involved in weed control problems — and that certainly includes sugar beet growers.

As soon as the entire program has been formed, a general announcement in detail of speakers and subject matter will be made, and will appear in the winter issue of the BULLETIN.

BUILDING A BEET BED*

THE TRUCKS which haul sugar beets from the fields to the various Spreckels Receiving Stations represent a wide range of designs—some are well worked out with the convenience of the driver and the receiving station crew well considered, while others are deficient in these respects. So it may be of interest to look over some of the better designed trucks which arrive at our receiving stations, and to take note of the features which might be included in a composite, ideal design.

BASIC TYPES OF BEET BEDS

Twenty years ago, beet beds were constructed after a more or less standard pattern which was shown in the Spreckels Sugar Beet Bulletin for July-August, 1946. This design was brought up-to-date again in July of 1950.

However, since 1950 there have been certain trends away from the old standard construction, principally in the direction of beet beds which can also serve as grain tanks, and which are readily installed on existing flat rack truck bodies. The construction details given in this article apply for the most part to this type of bed.

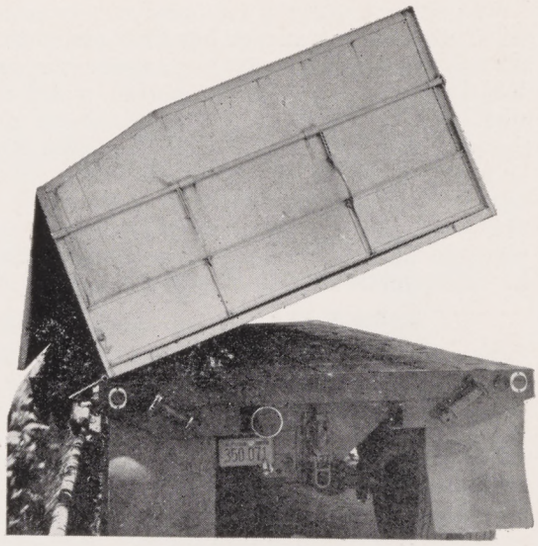
CONSTRUCTION DETAILS

Basically, a beet bed consists merely of a box, open at the top, and with one of its sides hinged at the top so that it may swing outward as the box is tipped on its bottom corner.

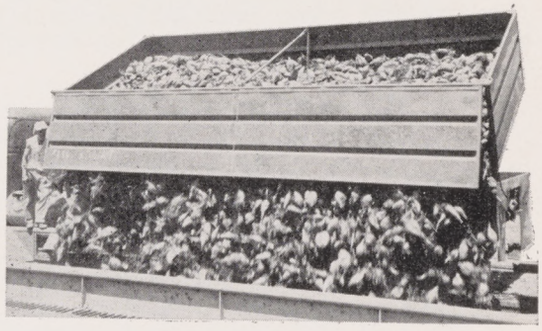
The bottom, sides, front, and back are panels whose only function is to restrain the load of beets or other contents of the bed. In designing these panels, the objective should be maximum rigidity at minimum weight and minimum cost. While almost an infinite variety of panel constructions might be considered, there are three principal, practical types. The first, and perhaps the most desirable from an all-around standpoint is an all-steel construction, and a design for such a bed appears on the following pages.

The next choice as a compromise between first cost and long life would be the old standard tongue-and-groove construction using boards 1¼" thick stiffened with cleats.

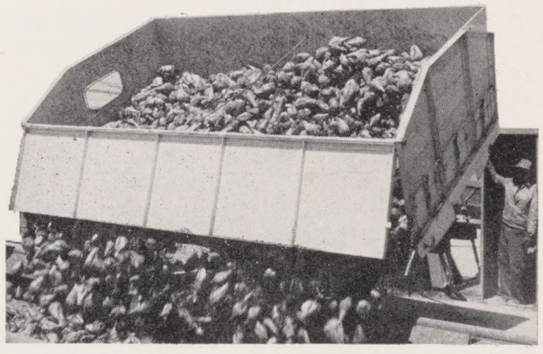
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A BEET BED with a slide-gate at its end can be used for either beets or grain, and can also be easily detached from the truck's regular flat bed.



SHEET STEEL (12 gauge), with lengthwise corrugations. All construction was done in the farm shop except corrugating the panels, a job for a press brake (available in Sacramento, Rio Vista, Stockton, Salinas or Bakersfield).



PLYWOOD (⅝", 5 ply waterproof "Plyform") with a suitable angle-iron frame work makes a light structure, but is less durable than sheet steel. However, it lends itself to farm-shop construction, and panels are easily replaced if damaged.



TWO STEEL BEDS are conveniently mounted on a single long flat rack semi. Beds like these—each about 16 feet long—lend themselves to mounting either as shown, or singly on bobtail trucks.

* This is reprinted from an article by Austin Armer in the May-June, 1958 issue of the BULLETIN. The designs shown have since been widely adopted, and are now in general use.

The third construction involves the use of waterproof plywood—the type used for concrete form construction and generally sold under the name "Plyform." When this material is used, a rather complete steel skeleton is required to surround and stiffen the plywood panels. Nevertheless, the construction is perhaps the least costly initially and is much lighter in weight as compared to the other two types. While its life may be the least of all, it has the advantage that worn or broken plywood panels may be replaced at low cost by an unskilled worker.

RIGHT HAND or LEFT HAND

Several years ago, the Spreckels Sugar Company standardized their receiving stations so that all trucks delivering beets in District 1 would dump to the driver's right side. These stations are Spreckels, Welby, Elsa, Soledad, Bolsa, Hollister and Quadalupe.

At the same time, all other receiving station (Sacramento and San Joaquin valley) were standardized to receive beets dumped to the driver's left side.

In building a beet bed, the location of the hinge and sling should correspond to the district in which the truck is to operate.

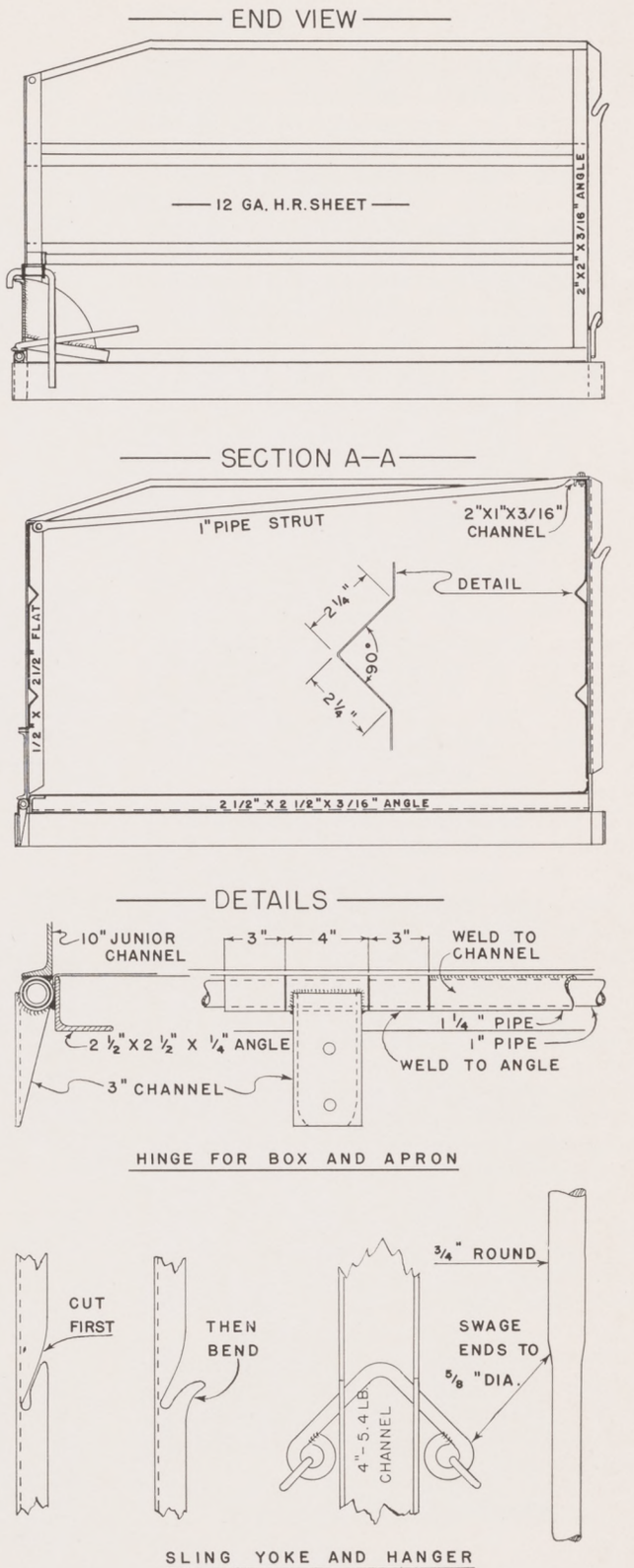
LEGAL ASPECTS

It is essential that the design of a beet bed be in accordance with the requirements of the California State Vehicle Code. As this code affects the construction of a beet bed, the outstanding requirements are:

1. Maximum width over all protuding members shall be no greater than 96 inches.
2. No part of the load may be permitted to fall from the vehicle.
3. Any vehicle (truck or trailer) must be provided with approved electric turn indicators both front and back.
4. All vehicles used for hire shall bear the name of the hauling contractor.
5. All vehicles used in hauling beets should have facilities for night driving.
6. The distance from the center line of the steering wheel to the extreme left hand side of the vehicle or its load shall be not greater than 24".
7. Flaps must be provided behind rear wheels.

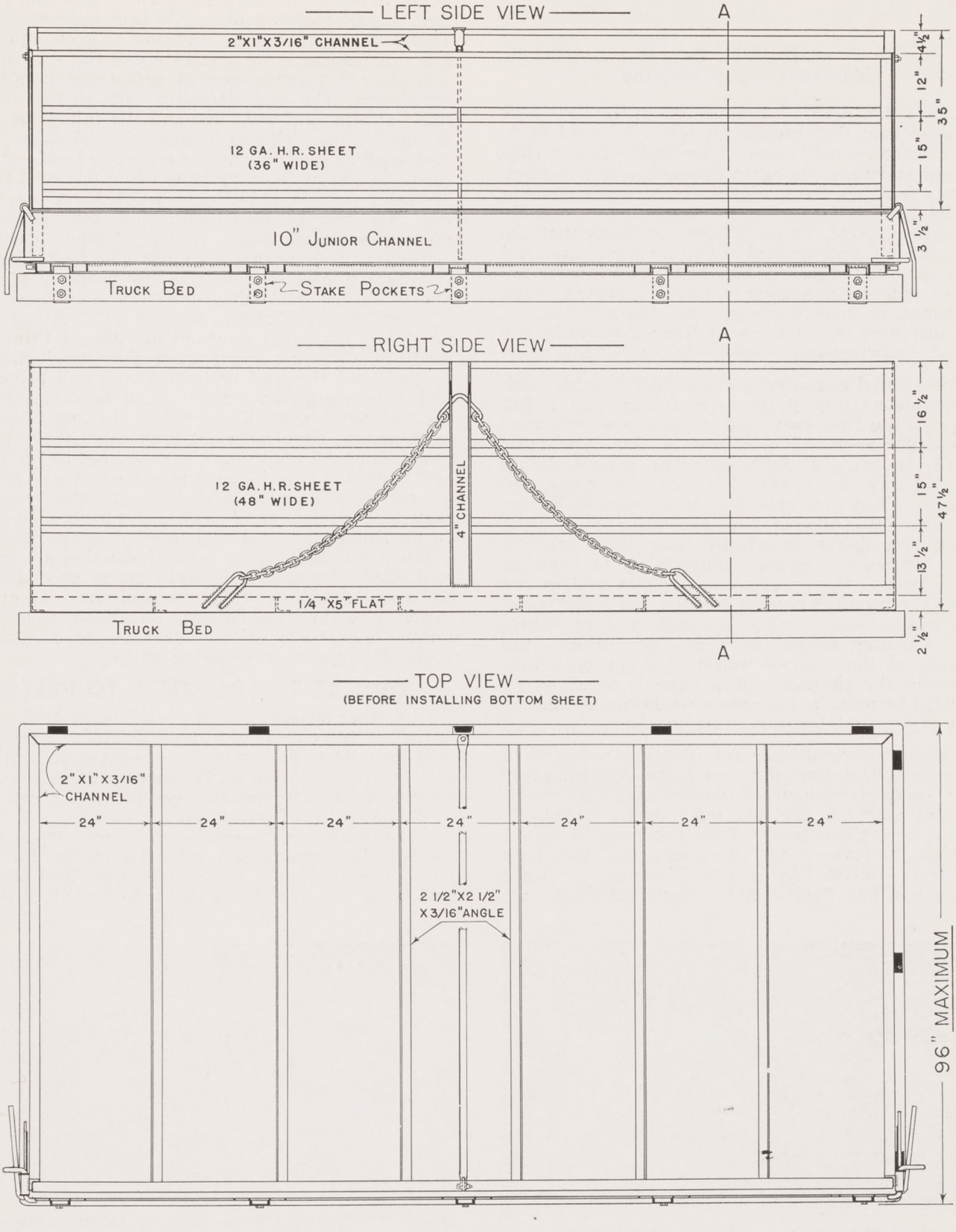
A word or two of explanation is in order. With respect to the maximum width (96"), it is important that the chain or cable sling be within this 96" dimension even though swinging during travel. (One objection to a cable sling is that the stiff cable may form loops which extend beyond the 96" width.)

With respect to the spilling of the load, there is nothing in the vehicle code which says that the beet box shall be free of all openings of any size whatsoever. It merely requires that no load be spilled. Therefore, the letter of the law could be served if the beet bed is constructed of boards spaced at a distance less than the smallest beet which might be expected to occur in the load. In any event, when any portion of the load, be it beets or dirt, is spilled during travel on a public highway, the operator of the vehicle is responsible in the event of civil suit arising from such spillage.



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BEET BED—end view, section A-A and details of construction.



61

BEET BED—left side, right side and top views. Lengthwise dimensions are not shown, since these will vary to suit the individual truck. However, a long semi should have two short beds rather than a single long one. Beds over 20 feet long are too limber for safety.

WILD BEETS -- A RECURRING PROBLEM

By NORMAN SHELTON, Field Superintendent
Spreckels Sugar Company

IN 1953 AN ARTICLE appeared in the Spreckels Sugar Beet Bulletin dealing with the weed problem created by wild beets. Then in the fall of 1955 several articles were again devoted to this subject. It was felt that the number of wild beets showing up throughout the beet growing areas was steadily increasing. Now, 11 years later, it seems that the occurence of uncontrolled volunteer beets and wild beets may be increasing once again. Wild beets are to be seen in increasing numbers growing along roadsides, in open fields and in alfalfa fields. In two instances that I know of their seed stalks are already showing up in beet fields planted this year.

The normal commercial sugar beet is a biennial, which means that it produces foliage and a full size root the first year, and requires a second year to produce seed. Thus a beet of this type must usually be irrigated during the first summer of its life and then overwintered before seed stalks will appear. When the flowers of these seed stalks become pollinated, the resultant seed will produce beets which may differ genetically from their parents. They exhibit an amazing adaptability to environment, even to the production of viable seed in one year. Having thus become annuals, the now "wild" beet can survive rainless summers and reproduce with alarming speed. In a few generations, the progeny of the original well-bred sugar beet have taken on the character of a noxious weed — an annual like most of the weeds we normally control such as pigweed, lambsquarter, purslane, etc.

Fortunately, wild beets are of little concern when beets are followed by other row-crops. Any volunteer beets are easily recognized and can be taken care of. This, of course, is just one more reason why beets should not follow beets. Wild beets do become a problem, however, when the commercial beet crop is directly followed by alfalfa. The mere presence of beets in hay field is bad enough, but the worst, is yet to come. It has been noted in previous years that the adaptability of a wild beet is tremendous. The beet will no longer continue to grow upright, but will instead grow prostrate and the seed stalks will grow flat on the ground, safe from the alfalfa cutter bar. The real difficulty with all this comes after alfalfa is plowed out and the following crop is sugar beets. This is because the volunteer wild beet seedling looks much like a normal beet and can easily be left at thinning time while the good beets are taken out. Wild beets growing in a commercial beet field will produce nothing but seed stalks — no large roots, no sugar. (See right photo, cut 63).

The best time to take care of a wild beet problem is before it ever gets started. A properly plowed and/or disked field which has first been taken out of beets is the cheapest method of fighting this problem. Since this is commonly done I think we might tend to get lax toward this problem. We forget about the wild beets that can, and probably will grow along fence rows, ditch banks, railroad right-of-ways, and alfalfa fields. In any of these instances it is not sufficient to merely cut the plant down. The seed stalk must be taken out of the field and burned, since the seed may be mature enough to produce new plants. Wild beets can also be easily destroyed with general contact herbicides such as oil emulsions fortified with dinitro compounds.

When wild beets occur in hay fields they are easily controlled with a contact weed spray used during the dormant season. This is feasible since an application of a fortified oil over an alfalfa field containing wild beets or any other weeds, is usually beneficial to the next cutting of hay.

WILD BEETS ARE HOSTS TO PESTS

One other adverse role the wild sugar beet plays is that of the almost ideal host plant for the sugar beet nematode and root knot nematode. In an infested field of wild beets where nematode exists there is little difference between this and a rotation of continuous beets after beets.

Along with a host plant for soil borne organisms, the wild beet makes an ideal reservoir for the yellows virus complex of Western Yellows, Beet Mosaic and/or sugar beet yellows virus. Any or all of these

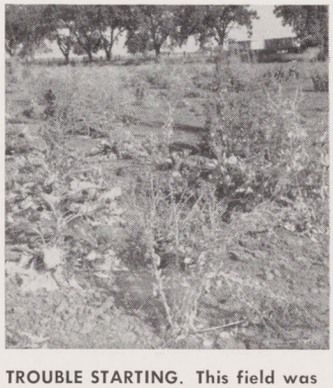


VOLUNTEER SUGAR BEETS grow in alfalfa field because the soil was inadequately tilled following a previous beet crop.



62

PROSTRATE WILD BEETS evolve during subsequent seasons. They survive and produce seed despite mowing of alfalfa.



TROUBLE STARTING. This field was not disked after the previous year's beet crop. It is now covered with volunteer beets, whose abundant seed cover the ground.



63

TROUBLE ARRIVING. Bolting strains of wild beets carried over from crops several years previous are left by thinners to contaminate this otherwise good crop.

three can easily be spread from the wild beet to commercial beet field by the green peach aphid.

In summary, wild beets have not as yet become a wide-spread major problem, although they can certainly become one in the absence of control measures. The purpose of this article is to bring to light once again that a wild growing descendant of the commercially grown sugar beet can create a very real and serious menace, both as a noxious weed and as a host plant for sugar beet diseases and soil borne organisms. Fortunately, good cultural practices and a sharp eye for volunteer beets can help minimize the wild beet problem.

INTERNATIONAL HARVESTER CO. OFFERS NIP ROLL CLEANING SCREEN

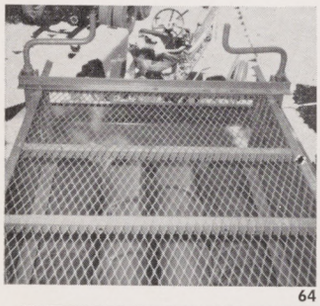
TO MEET THE demand for beets with lower tare, International Harvester Company offers their Recleaner Attachment, designed to complement the cleaning capability of all IH23, 24, and 25 sugar beet harvesters.

This cleaning screen uses two tire carcass rolls rotating against two helically wrapped steel rolls. For extra effectiveness, the carcass rolls spin slightly faster than the steel rolls (280 RPM, compared to 265 RPM for the steel rolls).

The rolls rotate on sealed bearings, and are driven by forged steel bevel gears.

The opening between each pair of rolls is adjustable in width and can be narrowed to save small beets if dirt conditions are mild.

The front end of the roll assembly can be tilted up or down with hand-cranks for faster or slower movement of beets during the scrubbing process.



64

LEFT — The nip-roll recleaner attachment for IH24 Harvesters (below) is adjustable for slope by the hand cranks, and is covered by a protective screen.



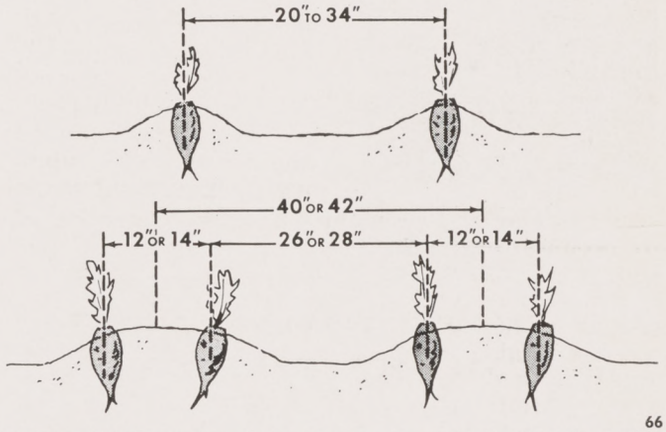
IHC Photo

65

ROW SPACING NOW ADJUSTABLE

The IH24 harvester is now offered as a convertible machine, able to accommodate single row plantings spaces from 20″ to 34″, or two-row beds spaced from 12″-26″ to 14″-28″.

Except for the hitch, power driven clutch, puller wheel post and jack stand, the convertible model is basically the same machine as the current No. 24.

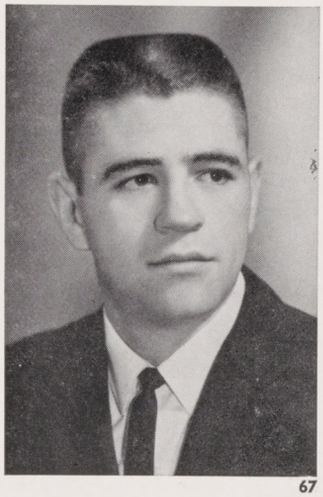


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THIS SHOWS the variety of row spacings to which the IH24 Convertible Beet Harvester is adjustable.

Notes from Our Field Men

FRANK R. NELSON — Sucro - Elmira



67

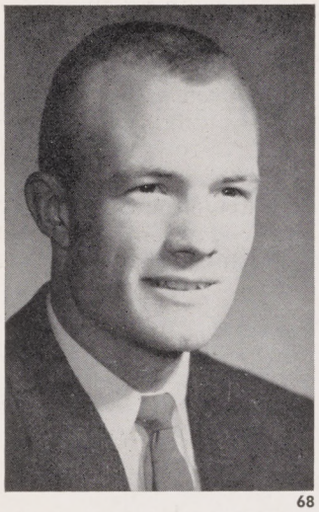
August 19 marked the end of a 20-day hot spell, during which temperatures exceeded 100° every day. I'm sure the extended hot spell left its calling card. The beets in my area don't show any visible damage, but undoubtedly they would have done much better if it had been cooler.

Tomato growers are much relieved; the sunburn in many fields was getting to be terrific, and the machines just could not keep up with the fruit as it needed picking. Fifty acres of lettuce in Dixon were lost. The hot clods in the field burned the cotyledons as they came up. One grower lost a field of cucumbers; they were cooked right on the vines.

All in all everyone is breathing a sigh of relief with this welcome change in the weather.

(*Continued on next page*)

GENE WILKINSON — Woodland



68

Harvey Rominger, a grower of mine who does a lot of work himself, had a very good idea which I thought I might pass on. He has a starter button installed on the back bumper of his pick-up which is wired so that it will turn the engine over, but won't start it. Then when he has to hook up a carryall or any other type of equipment, it is an easy one-man job. He can put his gear-shift in reverse, walk to the rear, lift the implement tongue, and use the starter to move the pickup back to where he can put the pin in the hitch.

HARVEST PLANNING AND SUGAR BEET TRANSPORT

(*Continued from page 27*)

soon be processing beets into sugar and all four factories will be "on stream".

Present plans include a sustained operation into the fall as late as weather will permit the operation of one or more factories. If a four-factory operation can be conducted into mid-December, the spring harvest will most likely be terminated in 45 to 50 days after its start, excluding delays caused by rain. On the other hand, if fall operations cease because of heavy rains in late November, some 10 to 15 additional spring harvest days are apt to be required. This is the game we must play, grower and processor alike attempting to outguess the weather. Until the time that we can accurately predict rainfall patterns and amounts of moisture that may fall, our only recourse is in flexibility of operation. The ability to adjust to each new situation is essential in providing the most reasonable harvest that weather patterns will permit.

The movement of beets up and down the State of California by the beet sugar industry may certainly and appropriately be termed "Big Business". The magnitude of this business and its impact on the transportation industry is adequately evidenced by the 4½ million dollars that Spreckels Sugar Company, alone, paid commercial carriers, both on rail and rubber, for transporting the 1965 crop to our processing facilities.

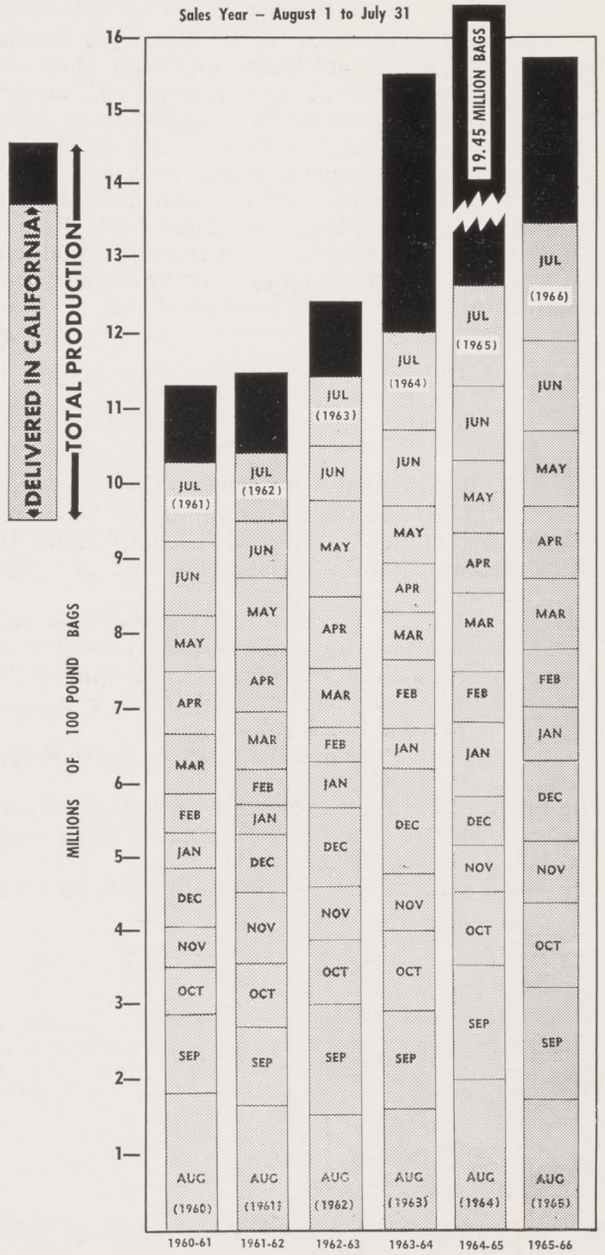
SPRECKELS SUGAR BEET BULLETIN is issued quarterly by the Agricultural Department of Spreckels Sugar Company as a service to its growers. Mention of specific methods, devices and implements does not constitute an endorsement by the Company. All photographs by the editor unless otherwise indicated.

AUSTIN ARMER, EDITOR

SPRECKELS SUGAR COMPANY WOODLAND, CALIFORNIA

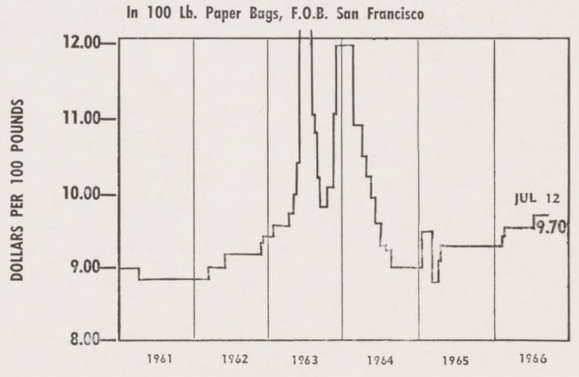
PRODUCTION AND DELIVERIES OF BEET SUGAR

Sales Year – August 1 to July 31



QUOTED PRICE OF BEET GRANULATED SUGAR

In 100 Lb. Paper Bags, F.O.B. San Francisco



69

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PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

SPRECKELS SUGAR BEET BULLETIN

VOL. 30 WINTER, 1966 NO. 4



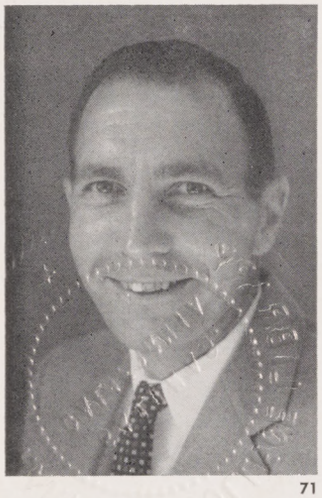
70

PEACEFUL CO-EXISTENCE

between sugar beet seedlings and weeds is one aspect of spring mechanization. The whole story of a successful and dependable chemico-mechanical beet growing program is outlined on page 38.

A COMPREHENSIVE PROGRAM FOR ECONOMICAL SUGAR BEET PRODUCTION

By LAUREN BURTCH, Chief Agronomist,
Spreckels Sugar Company



71

THERE HAVE BEEN changes in the cultural practices used by sugar beet growers — planting dates have shifted to permit a planting season lasting nearly nine months, major improvements in tillage tools have been accomplished, and chemical herbicides have been developed that couldn't be imagined twenty years ago. Unfortunately, weed problems have often intensified with the shift in planting date patterns and as new areas have entered sugar beet production. Labor has further complicated the picture by becoming simultaneously less efficient and more costly, leaving the sugar beet grower with the choice of growing profitable beets without labor, or diverting his beet acreage to other crops. In the face of this challenge, the sugar beet grower needs to realistically examine his entire cropping program to determine his best acreage level considering crop rotation, equipment, and his best production and profit potential. This examination should favor continued participation in sugar beets on a sound basis, for certainly sugar prices are improving and most 1966 beet growers have the tools on the ranch necessary to improve production. We are firmly convinced that yields and efficiency can increase in the face of high cost labor with a planned sugar beet program.

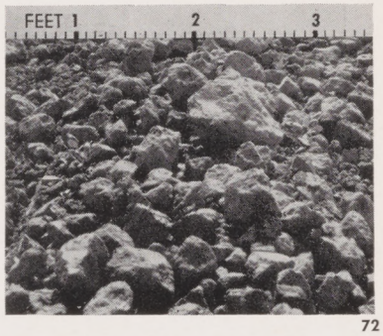
FIRST SELECT THE FIELD

It is no secret that the sugar beet is not a good competitor with weeds. Consequently, select the field first and then plant on the cleanest ground available. This includes choosing a soil that has good water penetration and subbing qualities. The field should always have enough fall to prevent flooding or ponding of the beds, since successful mechanization depends on uniform stands and good water control.

Now that weed control materials, defoliants and other chemicals are being applied to more crops in a grower's rotation, it is extremely important to follow the manufacturers' recommendations for rates and intervals between the application date and the planting of a possibly susceptible crop. Sugar beet stands may be reduced by materials such as the trifluralins, certain cotton defoliating agents, and persistant weed control chemicals. Growers should be especially cautious when following cotton or beans treated with the trifluralin materials. Plowing and frequent irrigation or rainfall will bring about the fastest breakdown of these materials. Remember that calendar time alone is not sufficient. Moisture for breaking down the trifluralins must be present.

Growers should also remember that while sugar beets are extremely "salt tolerant", germination may be delayed or reduced by heavy salt concentration in the salt zone, and salt problems that prevent water penetration or wetting of the bed can result in restricted yields in the high maximum temperature beet growing areas.

Land preparation operations need to be carefully considered and conducted to provide the good seed bed necessary for precision operations and satisfactory chemical weed control. Remember that a "powder seed bed" is as unsatisfactory as "grapefruit sized clods" for good precision operations. This means that for either late fall or late spring plantings, pre-irrigation can well be the most suitable approach for improving precision operations, obtaining better mechanical weed control, faster coverage or ground with the first irrigation after planting.



"GRAPEFRUIT sized clods" do not make a good seedbed. But even worse is a finely pulverized "powder seed bed."

72

One of the principal pitfalls in an efficient precision approach results from poor listing. The listing operation should always be accomplished in multiples of the planter row spacing. This means using a 5 or 9 bottom lister for a four row planter, or a 7 bottom lister for a six row planter arrangement. This arrangement permits one of the outside shovels to return in the last furrow of the previous pass. While this arrangement may be considered inefficient, it provides the best means for keeping the planter units centered on all beds, and is the best insurance against too narrow or too wide guess furrows. The present day precision sled has little tolerance for narrow guess furrows and often will eliminate one of the adjacent rows.

CHEMICAL WEED CONTROL

"BEETS WITHOUT WEEDS" was the cover title of the last issue of the *Spreckels Sugar Beet Bulletin* in 1947. The cover as reproduced on page 39 compared weed free beets with those emerging in a mass of weeds. The 1947 cover was only a hopeful promise for the future. Today, twenty years later, that promise can be a reality for many sugar beet growers. Unfortunately, while excellent pre-emergence chemicals are available today, they are not always efficient for all weed problems or planting periods.

SPRECKELS SUGAR BEET BULLETIN

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. XI NOVEMBER-DECEMBER 1947 No. 6



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BEETS WITHOUT WEEDS

Pre-emergence spraying experiments point toward noteworthy savings in hoeing and cultivating costs. While now in the experimental stage, pre-emergence spraying may become common practice for growers who plan a judicious planting and spraying program.

73

THE PROPHESY made nearly 20 years ago has come true. Pre-emergence spraying has indeed become common practice, but every precaution must be taken to insure its effectiveness.

FALL AND WINTER PLANTINGS

For growers who plant in the fall and winter (October to February 1), pre-emergence chemical weed control can seldom be recommended. Several factors limit the effectiveness of available herbicides for this planting period. First, available chemicals seldom provide control long enough to carry the crop past thinning. Second, winter weeds (mainly oats, barley, mustard and fiddleneck) are often not sufficiently controlled to warrant the expense, and finally, weather patterns are less predictable during the late fall and winter period. Thus the decision to surface apply the chemical after planting but before emergence, or to mechanically incorporate the material is too often affected by the inconsistencies of rainfall and the chemical characteristics of the herbicide.

The picture is not all black for this planting

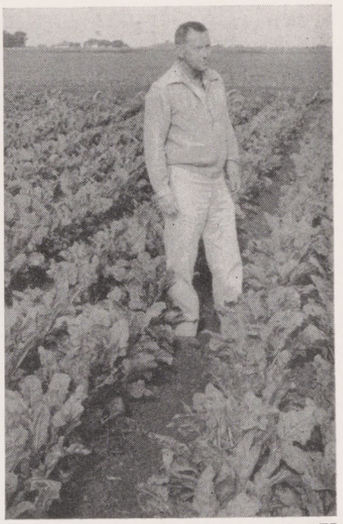


THESE TWO VIEWS of the field shown on the cover are an example of completely effective pre-emergence spraying with Tillam. However, the weeds remaining between the beet rows should have been destroyed by cultivation before reaching this size.



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75

GRASSES AND VOLUNTEER GRAINS can be controlled with Dalapon, as these "before and after" photos show. But very young beets are injured by Dalapon, so that the voice of experience must be heeded regarding application rates and beet seedling size.

period, however, for materials such as barban, which is specific against wild oats, can be applied effectively when the oats reach the two leaf stage. Since beets are tolerant of the material, higher rates can be used than can be applied in grain fields.

Dalapon may also be used for post emergence control of grassy weeds and volunteer grain. Since beets can be injured by dalapon, recommendations for beet and weed size and rates of application must be followed closely. Dalapon acts slowly and its principal advantage lies in its ability to retard growth during wet weather periods, hence buying needed time for more effective mechanical control.

SPRING PLANTINGS

Pre-emergence herbicides have recently gained widespread acceptance for use on beets planted during the period from February through mid-June. Materials such as tillam or Ro-Neet have proven to be consistently effective when used at recommended rates, and when properly applied and incorporated into the row. It must be remembered, however, that a complete knowledge of the characteristics of the weeds expected, and details of application techniques are required if maximum benefits are to be obtained. The seed bed preparation can be most important, and often a grower planting in the late spring in a dry cloddy seed bed might profitably pre-irrigate in order to obtain a good seed bed. This practice could also provide for a better initial application and perhaps more effective control through better and more timely control over irrigation applied during the 4 to 6 weeks period of herbicide activity. We must remember that the available herbicides are relatively short lived and hence the grower must, through careful timing of irrigation and cultivation and thinning operations, use this effective control period for the advantage of the beet and not the weeds.

(Continued on next page)

PLANTING OPERATIONS

Uniform placement of standard monogerm commercial seed can be accomplished if a few simple precautions are taken. Beds should be shaped to the correct height and width for the individual's soil and irrigation conditions. The planters should be checked for mechanical problems, and each unit should be set to plant the same depth and rate. The seed interval and depth must be considered for the time of the planting period, weather patterns, expected weed patterns and emergence difficulties. Rates should be selected to provide enough beets to permit use of mechanical stand reduction tools, but not heavy enough to prevent some separation between seedlings after emergence. This rate generally would lie between 6 and 12 seeds per foot. Space planting for the 1967 conservative beet grower should be avoided unless his conditions for stand establishment and weed control are nearly perfect.

The beds should be shaped firmly, and the planter sled equipped with enough contact points in the front and rear to prevent "fishtailing". Packer wheels should be set to provide positive traction without leaving deep indentations in the bed. The planter should plant in a planned sequence which can be followed by all succeeding operations.

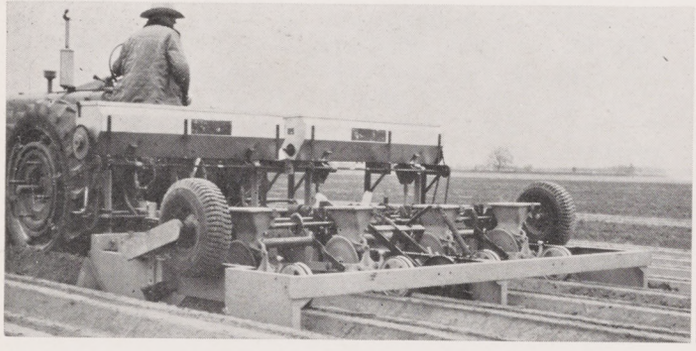
CULTIVATION

Cultivation in sugar beets offers two worthwhile advantages. First, weeds are destroyed and second, cultivation can effectively break the water seal in problem soils. When considering cultivation in terms of complete mechanization the question of when to start is often more important than what to use. "Should I cultivate before thinning" is a question that cannot be answered positively. It depends on the severity of the weed problem, soil type, and equipment available. It is often much easier to mechanically thin a beet bed which has not been disturbed, but the weed problem usually dictates the answer. Weeds that can be controlled easily and effectively before or just after they emerge can become resistant to cultivation by thinning time. Therefore, earlier cultivation when weeds are expected, should be a must, but the cultivator should be set to work closely, and with tools adjusted to keep soil off the seedling beets. The precision sled is generally the best aid the mechanization minded grower can acquire. It is fast, accurate, and can make a cultivator expert out of most conscientious tractor drivers. There are some pitfalls, however. First, the exact planting pattern must be followed and it is advisable to follow a pattern that permits both outboard shovels to run in either undisturbed furrows or disturbed furrows. Second, the sled must have enough contact points to keep it precisely where it should be. When using cone guides, more than two must be used if close cultivation is to be successful. Using guide points on the back as well as the front prevents "fishtailing", and permits the rapid close cultivation that can eliminate most weeds before thinning. As the beet increases in size, the depth and distance from the beet can be altered. Remember do not "heave" the soil which may break the tender tap root. Keep knives staggered to reduce trash accumulation, and set the furrowing shovels accurately, since these furrows affect the accuracy of all subsequent operations including harvest. If cultivation proceeds, thinning the beds should be rolled to "break the core" or to smooth the beet row for a more uniform thinning job.

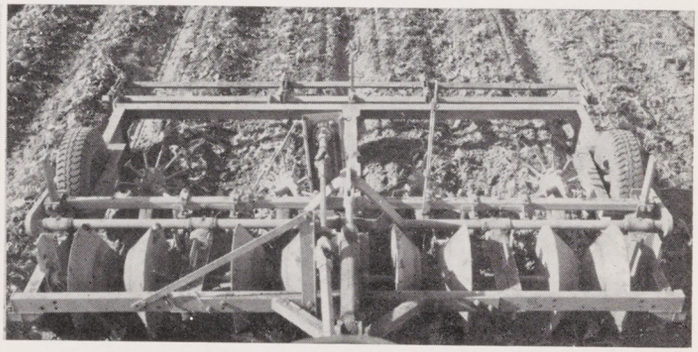
THINNING

Every 1967 grower who has the necessary equipment should plan to thin his beets mechanically. Circumstances such as inadequate stand, severe crust or perhaps certain weed situations may make hand thinning or hoeing advisable, but it is much easier to prepare for mechanical thinning and then back down to hand thinning than it is to plan to thin by hand and be forced to change to a mechanical approach.

There are many mechanical blockers available using a wide range of cutting pattern and approach. Therefore, the grower should choose his seed spacing interval with consideration for the type of thinner he will use. None of the thinners are perfect, but all have merit and all can be used successfully if the bed and stand is tailored with the thinner's specifications in mind. One generalization seems to consistently hold — most inexperienced mechanical thinning supervisors will leave too many beets. Remember — long gaps are harmful, but so are multiples. Remember also that the short season



THE PLANTER SLED should work on firmly shaped beds, and should have enough contact points to prevent "Fishtailing."



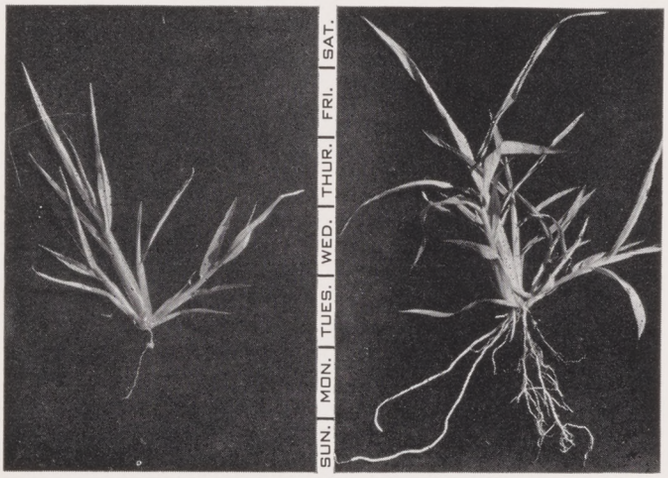
76

WHEN USED FOR THINNING, and especially for close cultivation, the sled must be kept precisely on row. Cone guides — two per bed — promote precise positioning.

crop requires a more accurate spacing interval than a long season crop. Too heavy a thinned stand coupled with a short growing season can lead to a lower yield.

LATE CULTIVATION

Most growers seem reluctant to cultivate more than once after thinning. Yet timely post thinning cultivation can insure both the harvest of clean beets and a higher gross return by controlling summer watergrass which not only complicates the harvest but often reduces the yield potential for the field. Newer mechanical "in the row" tools such as Planet Jr. row crop weeders and Spyders prove very effective in-the-row cultivation and mulching.



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SUMMER WATERGRASS will grow rapidly in the row, but is readily destroyed by such devices as Planet Jr. "Spyder" wheels. HOWEVER, it is essential to attack early, when each plant hangs by a single hair root (left). A week later (right), the plants are firmly anchored by a massive root system.

Recent experience with "layby" chemical herbicide applications have been encouraging, and growers on lighter soils might well be able to combine post-thinning herbicides such as the trefluralins with mechanical cultivation to improve summer weed control. The price is attractive with these materials. Water-run applications of pre-emergence herbicides such as EPTC (Eptam) have also looked promising for summer watergrass control in several localities.

For years we have looked to the future for mechanization of sugar beet culture and the pieces of the puzzle have been gradually falling into place. While the last piece of the puzzle may not yet be in place, the general picture can now be seen, and the 1967 sugar beet grower finally has the two essentials for mechanization — his own incentive, and the proper tools for the job.

YOUR ZIP CODE NUMBER, PLEASE

When notifying the Sugar Beet Bulletin of change of address, please be sure to state:

1) Your old address and zip code number.
2) Your new address and zip code number.

Thank you.

THE REWARD OF CLEAN GROUND, FULL MECHANIZATION AND GOOD SUPERVISION

By J. W. HULL, Field Superintendent,
Spreckels Sugar Company, Manteca



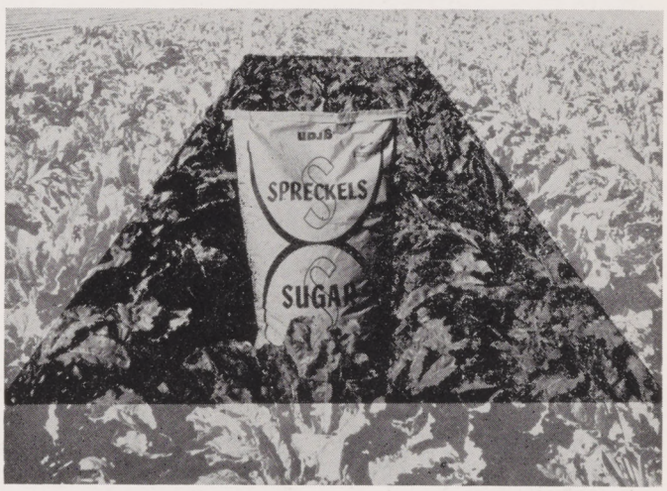
78

MR. JACK SCHADECK, supervisor for Peter A. Stolich Co. Inc., came up with some interesting methods and an excellent crop on some sugar beets planted at Brentwood this year.

Knowing that the land was fairly clean and that isolation should make an early planting feasible, he went to spaced plantings. Using Spreckels 301-H monogerm seed, he planted at 4 inch spacing on beds with the rows at 12 and 26 inches apart. After planting in early February, the beds were sprayed with endothol to aid in elminating winter weeds. A rain in late February aided placement of the chemical and started germination of the seed.

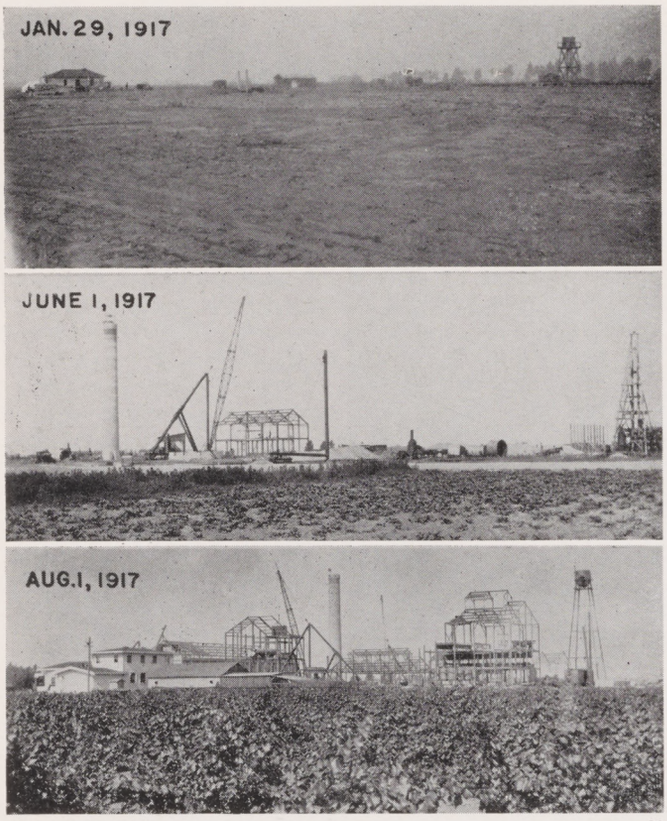
The stand was fairly uniform so no thinning was necessary. Jim Ledford, resident foreman, then ran a hand crew through the field to hoe the weeds. This crop, which emerged on March 1 and was harvested from September 20 to 25 inclusive, yielded 40.49 tons of clean beets per acre with 14.8% sucrose.

This is an outstanding case of top management, using methods that might not work elsewhere in the Central Valley to achieve good results, both as to low production costs and high yield.



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MUCH SUGAR — LITTLE LAND. Jack Schadeck's 11,985 pounds of sugar per acre is vividly illustrated by this 100 pound bag of sugar in the 364 square feet of beet field that produced it (an area 7 feet by 52 feet, or 104 feet of 2-row bed).



Photographer Unknown 80

TOP — The Manteca site, with test holes.

CENTER — The smokestack and machine shop take shape.

BOTTOM — The main office building and most of the steel is finished.

ENLARGED CAPACITY MARKS FIFTIETH ANNIVERSARY OF MANTECA FACTORY

AS THE YEAR 1916 drew to a close, plans were completed and the Manteca site purchased for the erection of Spreckels Sugar Company's second factory, with a daily capacity of 1200 tons of beets.

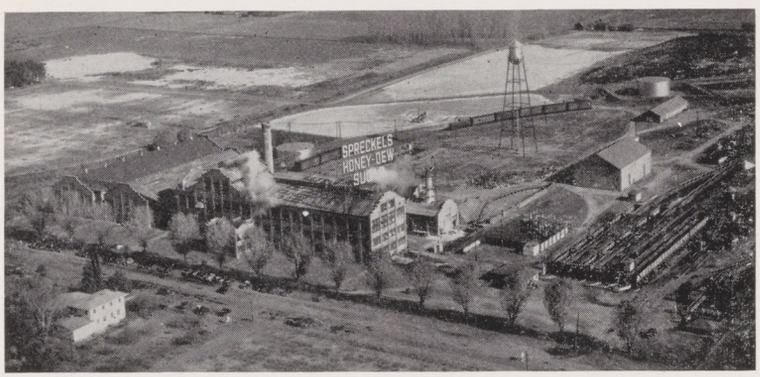
Today — fifty years later — a major revision of Factory 2 is approaching completion. The Spring Campaign of 1967 will mark the factory's capability of slicing 4200 tons daily — 3½ times its original capacity.

Already in operation are the components of the first stage of expansion. These are:

- Continuous adsorption process columns
- Two new steam generating boilers
- Turbo-generator, replacing reciprocating engine generator
- New carbonation station
- New general office building

Under construction are:

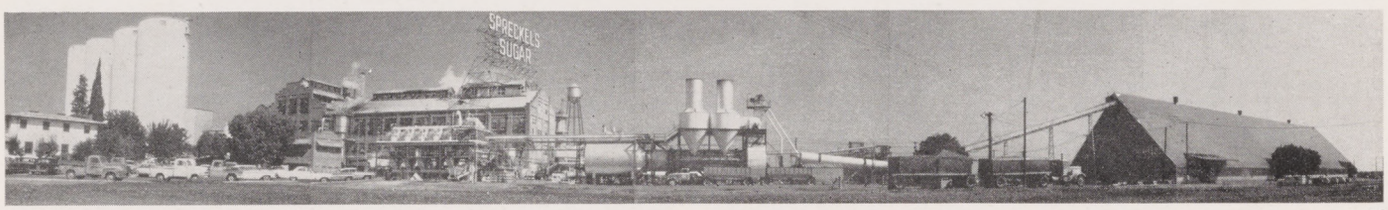
- Tower-type diffuser
- Additional pulp presses and drier
- Multi-hearth lime reburning kiln
- One new slicer
- Two new raw sugar vacuum pans
- Two new white sugar vacuum pans
- Two continuous crystallizers
- Two granulators



Moulin Studios 81

IN 1948 — Factory 2 retained its original features, except for an additional sugar warehouse (left).

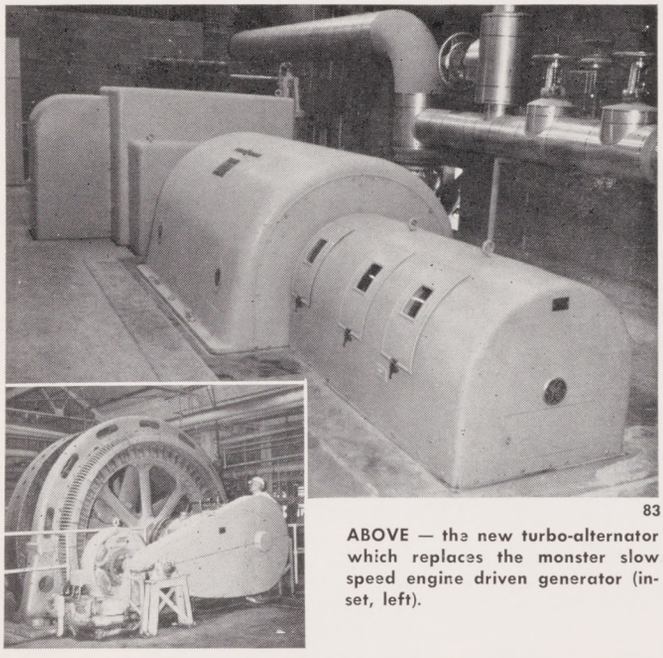
Of particular interest to growers is the radically re-designed beet receiving facility. This is a duplex installation, providing two separate receiving hoppers, elevator belts and nip roll screens. Two new 70 foot truck scales will speed the weighing of grower trucks. The entire receiving complex occupies a large area East of the pulp warehouse, making possible a traffic pattern which will facilitate truck movement.



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TODAY — The original Factory 2 is almost submerged in the recently built additions.

RECENT CHANGES IN THE MANTECA SCENE



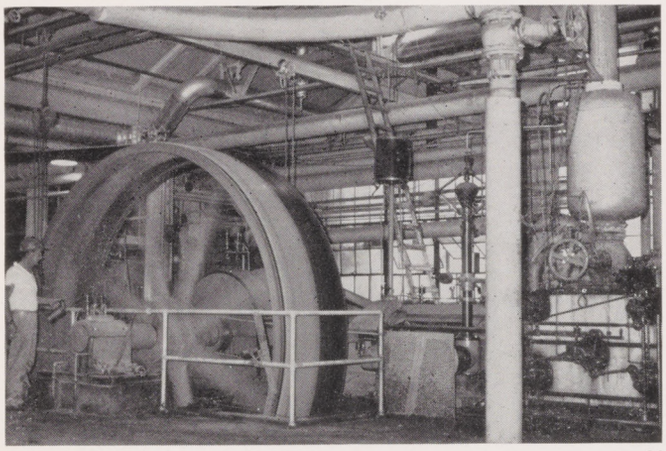
83

ABOVE — the new turbo-alternator which replaces the monster slow speed engine driven generator (inset, left).



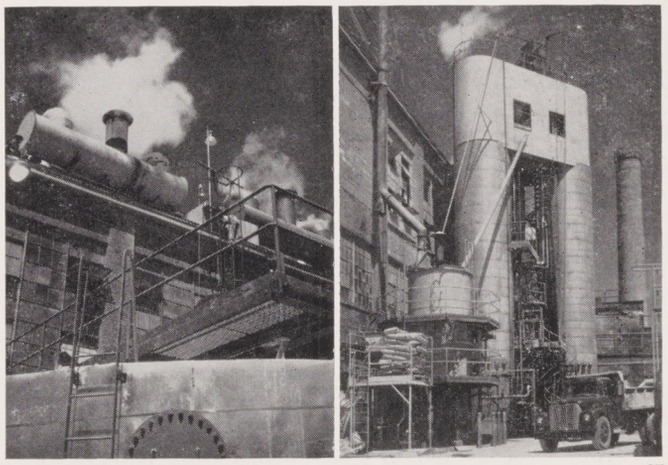
86

THE NEW general office building.



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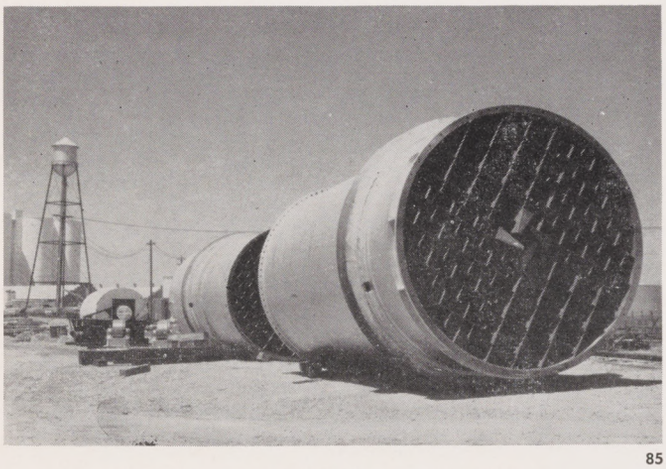
LAID TO REST. Gone is roar of the old "Sugar Engine" with its leather belt drive to the centrifugals.



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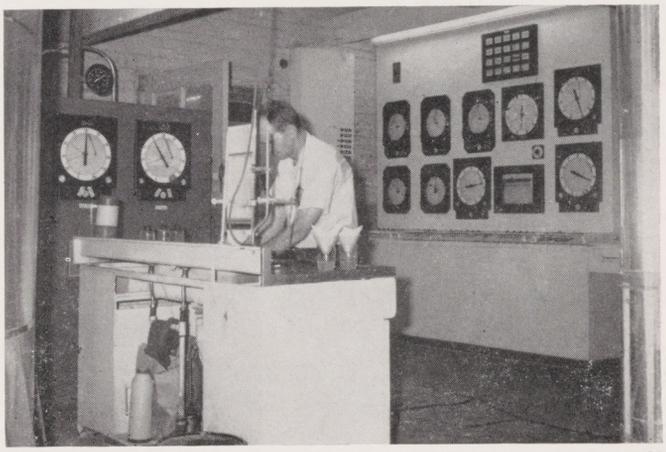
LEFT — NEW DORR THICKENER is in foreground. Foam headers of the new carbonation station above.

RIGHT — CONTINUOUS ADSORPTION PROCESS columns and carbon regeneration kiln.



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NEW PULP DRIER DRUMS await installation.



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NEW CARBONATION STATION is elaborately instrumented and automated

HIGH SUGAR PERCENTAGE IS RELATED TO LOW NITRATES IN ROOTS

By DR. VARON JENSEN, Plant Physiologist
Spreckels Sugar Company

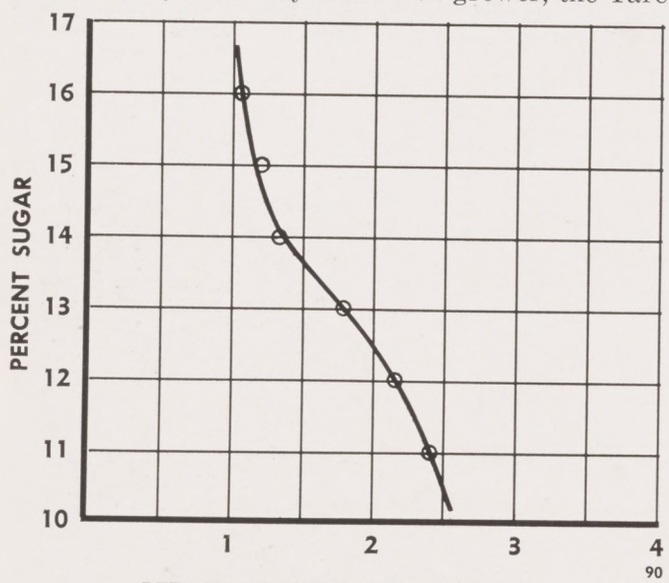


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THE INVERSE RELATION between the nitrogen nutritional status of a sugar beet plant and the concentration of sugar in its root has been well established. A high concentration of readily available nitrate apparently stimulates the beet plant to grow vegetatively, producing new, vigorous, green foliage and large sized roots low in sugar concentration.

In order to establish the extent of the association between beet nitrogen nutrition and root sugar content, a quick simple nitrogen test was needed, one which could be routinely conducted on a large number of samples and one which would produce an immediate, practical result. Spreckels Sugar Company has responded to this need.

A sensitive color test for nitrate nitrogen, using the chemical indicator diphenylamine, has been adapted to use on beet root pulp, the same material utilized in the determination of sugar content in beet samples. The test is now conducted in Company Tare Laboratories on beet samples collected from grower deliveries to all Company receiving stations. For each day's delivery from each grower, the Tare Laboratory reports to the Agricultural Department the average of nitrate results from a portion of the loads delivered during the day by the individual grower. This value is used by Company Field Superintendents to point out the relationship between the pulp nitrate test and the sugar test run on the same beet samples.



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BEET ROOT NITRATE RATING, BY DIPHENYLAMINE METHOD

THIS CURVE shows the close inverse correlation between beet root nitrates and sugar percentage. The data plotted were obtained from the analysis of 3,213 loads of beets, totalling 60,290 tons.

Pulp nitrate readings are assigned numerical values, based on the color intensity and the rapidity of the color reaction which occurs when the diphenylamine reagent is added to a thin smear of pressed juice from a beet pulp sample. The following table indicates the conditions associated with each numerical rating assigned.

Nitrate rating	Relative pulp nitrate concentration	Color development in diphenylamine reagent
1	Very low	A blue color does **not** develop or only a trace of light blue color develops, in the form of a ring, after several seconds. A brown discoloration is usually associated with juice low in nitrate nitrogen.
2	Low	A sky blue color develops. This color is slightly darker and it develops more rapidly than in the case of NUMBER 1 rating. Slightly less brown discoloration develops in the NUMBER 2 rating than in NUMBER 1.
3	Medium	A solid, navy blue spot develops rapidly. Little, if any, brown discoloration occurs.
4	High	A solid, blue-black spot develops instantaneously.

Data, collected to the present time, have indicated a strong inverse correlation between the pulp nitrate reading and beet root sugar concentration. During 1963 and 1964, John Alexander of Holly Sugar Corporation collected data from over 188,000 beet root samples taken from Northern California growers loads. He observed, "The sugar content of beet roots low in nitrate at harvest is always higher than that in beets high in nitrate grown in the same area and harvested under the same conditions of soil moisture."

Beet load samples collected in 1966 at Spreckels' Lerdo Station in Kern County yielded the following data, which illustrate well the inverse correlation spoken of above:

LERDO STATION HARVEST DATA — 1966

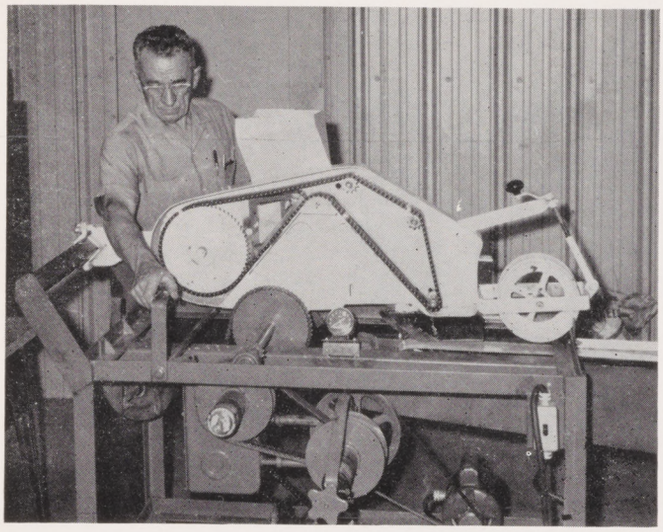
Mean sucrose content of loads:	16%	15%	14%	13%	12%	11%
Mean nitrate rating assigned:	1.08	1.19	1.27	1.81	2.13	2.41

(Data of J. G. Maurer)

A graphic presentation of these data is also presented in the chart on the left.

The above examples of data collected during a current beet growing season demonstrate the strong negative influence of readily available nitrate on beet root tissue sugar concentration. The association demonstrated by the data above is proving to be widespread. Growers who are anxious to improve the sugar test in their beet root crops must therefore constantly strive to manage soil nitrogen fertility so that excess available nitrogen will not be present in the beet at harvest time to depress sugar concentration.

NEW PLANTERS TREAT BEET SEED GENTLY, SPACE IT ACCURATELY

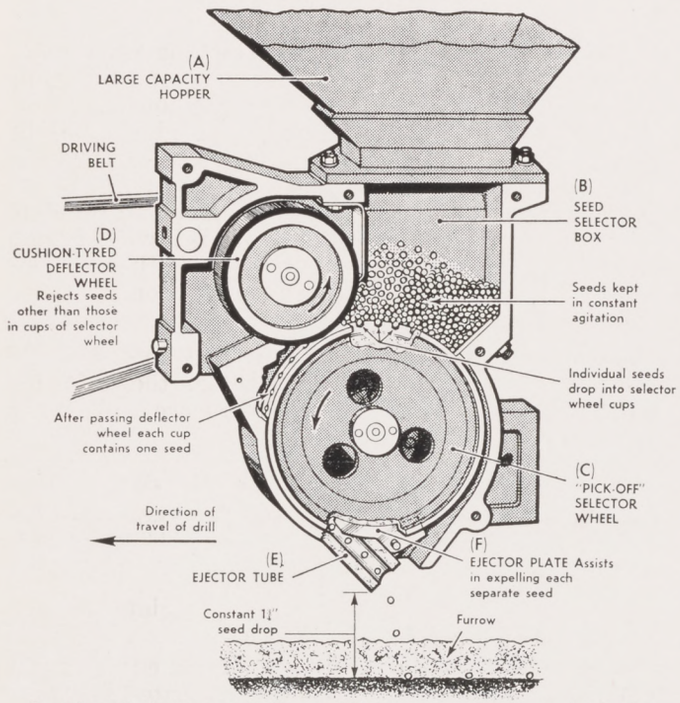


91

THE COCHRAN PLANTER will soon be in production by the Cochran Equipment Co. of Salinas. Martin Sanderson developed this precision planter, and is here seen making a performance test on the elaborate testing equipment he devised.

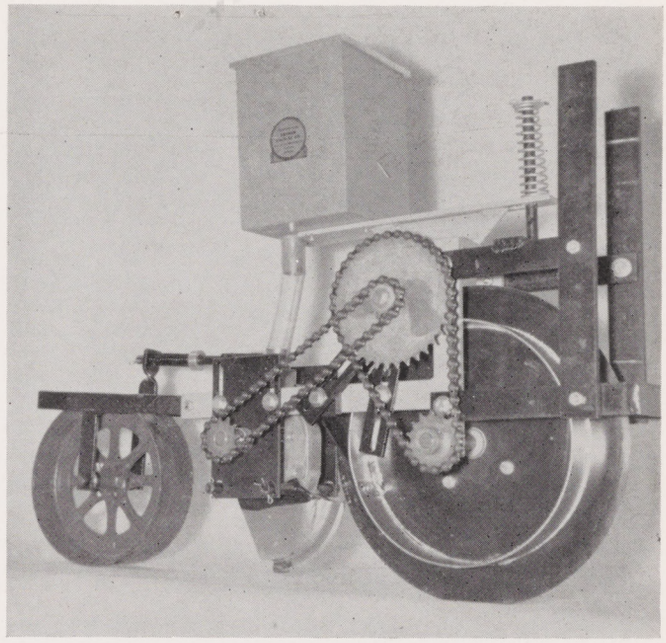
WEBB PRECISION DRILL

Seed selector mechanism



Seed from the large capacity Hopper (A) passes into Seed Selector Box (B) where it is constantly agitated by the action of the Selector Wheel (C) and Deflector Wheel (D). Seeds are individually picked up in the Selector Wheel Cups, any surplus being gently rolled clear by the cushion-tyred Deflector Wheel. Seed is expelled through the angled Ejector Tube (E) assisted by the Ejector Plate (F), dropping accurately to the bottom of the furrow. As the Selector Wheel ejects the seed in the opposite direction to the movement of the tractor, seed bounce is almost eliminated. Covering is completed by the adjustable Seed Coverer, and consolidation effected by the following Press Wheel.

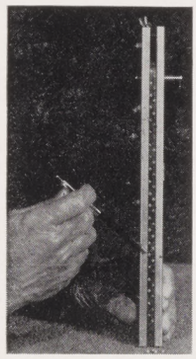
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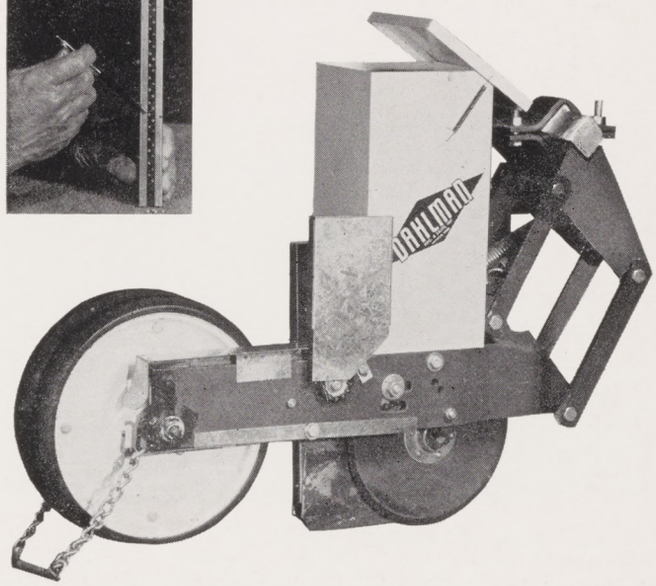
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THE GRAMOR #300 Precision Planter is made at Tolleson, Arizona, and distributed by Towner Meyer Co. of Stockton, California. It uses an aluminum seed-cell wheel, with rubber-faced cutoff wheel.

WEBB PRECISION DRILL is made at Exning, Suffolk, England and distributed by H. C. Shaw Co. of Stockton, California. This drawing and description are reproduced from the manufacturer's catalog.



THE DAHLMAN Sugar Beet Seeder, (below) is distributed in the Western states by W. E. Snell, Bakersfield, California. Seed is metered by a duplex rubber belt, notched for single seed pickup, and confined in a stainless steel channel (left).



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4-H SUGAR BEET AWARDS PRESENTED



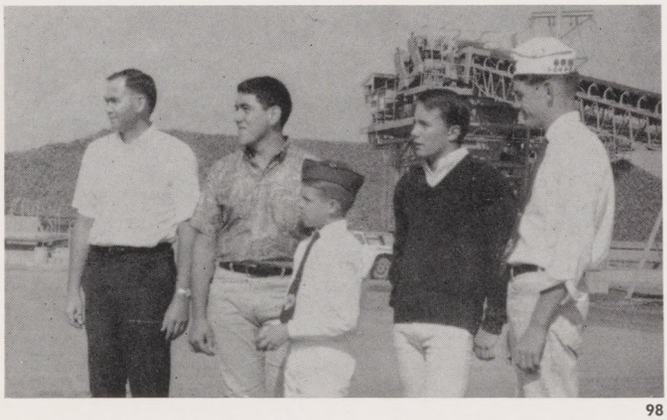
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AT SPRECKELS, Loyd Stovall, Spreckels 4-H Coordinator (R), presented silver bowls to top 4-H Clubbers Timothy Ricca of Monterey County (center) and George Jacinto, San Benito County (L).



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MEL VOOS (L) presents silver sugar bowls to 4-H'ers at Woodland. From left, Kim Timothy, Yolo County; Gerry Rominger, Colusa County, and Jeff Lang, Solano County, who received the award on behalf of his brother, Greg.

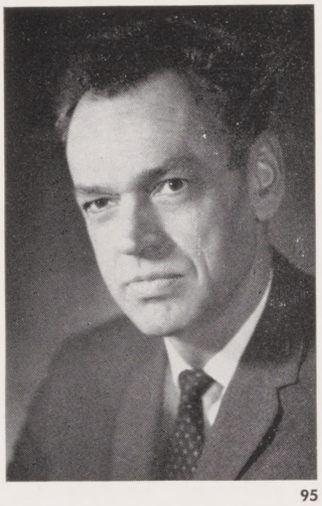


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AT THE MENDOTA FACTORY, Spreckels Field Superintendent, Jerry Nordstrom (L), explains beet receiving to 4-H winners of silver sugar bowls, L to R — Jim Petrucelli, Fresno County; Brian Clements, Tulare County; Tom Shirley, Kings County, and Gary Thornton, Madera County.

THE 1967 BEET PURCHASE CONTRACT

By GUY D. MANUEL, President,
Spreckels Sugar Company



95

I AM SURE THAT all of you as growers have heard something about the contract demands being made on the California processors by your beet growers association. One of the motivating reasons behind these demands has been the need for more money on your part to continue growing sugar beets. The returns on the 1964 and 1965 crops were most disappointing and we have no argument with the need for better returns. We fully realize that prices for sugar beets must improve above those levels or you will no longer be growing this crop.

Our basic objection to the California Beet Growers Association proposal lies not in the goal, but in the method of attaining the goal. Your association has requested that we include a guarantee in our purchase contract that is tied to a percentage of the New York raw sugar price quotation. In addition, they have requested that we change the sharing of the sugar dollar above a $7.50 net selling price to the same percentage as we now share below $7.50.

When these proposals were presented to us by your representatives, we studied them thoroughly and then did not accept them because over a long period of time we did not feel they were sound for us as a California processor.

Our great concern was that we would be tied to a price related to the New York market, while our principal competitor in California, a cane sugar cooperative, would not be tied to such costs. Inasmuch as they ship considerable amounts of sugar out of California, we felt that this pricing system for us could give them an advantage in the local market place that could force us into shipping more and more sugar out of California and thus lower our returns. This was the principal reason for not accepting the proposal.

It should also be stated that California processors pay substantially more for beets than any other processors using the participating contract, and if we were to grant the request for changing the scale, we would be paying even greater amounts than processors in other states. It should be kept in mind that on a certain percentage of our sugar we must also compete with these other beet processors and our disadvantage would become even greater.

Our unwillingness to change our contract was not taken lightly by us and I want to assure you that if we could have found a way to use this principle and

still adequately protect ourselves in the market place we would have done so.

Because we are paying more than the majority of our beet competitors in the United States and because we feel that we have always done the best possible job of selling sugar, we do not accept the premise that our present contract is unreasonable or unfair.

Prices have finally begun to strengthen and, as you know, we are already paying on an $8.00 net selling price basis for the 1966 sugar beet crop. There were a number of reasons for the depressed prices over much of 1964 and 1965. Some of these were tied in with the uncertainty of legislation. We not only built up excessive inventories during this period, but could not develop any long range marketing programs. Now we have sugar legislation through 1971 and our excessive inventories have reversed to minimum supplies. We cannot help but feel that the present strengthening of the market will continue and carry through 1967 into 1968. The basis for our whole relationship of sharing market risk has been built into the existing contract. With the price of sugar now at levels where you can see adequate returns, we can only conclude that the corner has been turned and there is neither need nor justification for changing our present contractual relationship.

CALIFORNIA WEED CONFERENCE PROGRAM IS ANNOUNCED

THE NINETEENTH California Weed Conference will be held at the Hilton Inn, 1775 East Mission Bay Drive, San Diego on January 24, 25 and 26, 1967.

Sugar beet growers — especially those whose rotations include a wide range of other crops — will gather much interesting information by attending the conference. Following is the program:

JANUARY 24, 1967 — AFTERNOON

1:00- 1:15 OPENING ADDRESS — President Cecil Pratt, Deputy Agricultural Commissioner, San Bernardino County

1:15- 2:15 NORTH AMERICAN WATER AND POWER ALLIANCE CONCEPT — K. D. McFarland, Ralph M. Parsons Co., Los Angeles

CROPLAND WEED CONTROL
Chairman — Hammond P. Ford, Farm Advisor, Imperial County

2:15- 2:35 WEED-CONTROL IN SUB-TROPICAL ORCHARDS — Boysie E. Day, Department of Horticultural Science, U. C. Riverside

2:35- 2:55 WEED CONTROL IN LETTUCE — J. M. Lyons, Department of Vegetable Crops, U. C. Riverside

2:55- 3:15 Coffee Break

3:15- 3:35 WEED CONTROL IN COLE CROPS — Art Lange, Agricultural Extension Service, U. C. Riverside

3:35- 3:55 WEED CONTROL IN SUGAR BEETS — William Isom, Agricultural Extension Service, U. C. Riverside

3:55- 4:15 WEED CONTROL IN COTTON — Hammond P. Ford, Farm Advisor, Imperial County

4:15- 4:30 Questions and Answers

JANUARY 24, 1967 — EVENING

5:30- 7:00 No-Host Social Hour

JANUARY 25, 1967—MORNING

AQUATIC AND NON-CROPLAND WEED CONTROL
Chairman — Oscar Fudge
Imperial Irrigation District

8:45- 9:15 ALLIGATOR WEED AND SKELETON WEEL CONTROL — Murry Pryor, California Department of Agriculture, Sacramento

JANUARY 25, 1967—MORNING

9:15- 9:35 APPLICATION METHODS FOR AQUATIC WEED CONTROL AND DISSIPATION OF HERBICIDES IN WATER — Richard R. Yeo, U. S. D. A. Agric. Research Service, U. C. Davis

9:35-10:05 WEED CONTROL ON THE LOWER TULE RIVER IRRIGATION DISTRICT — J. Ralph Offutt, General Superintendent, Porterville

10:05-10:25 Coffee Break

10:25-10:45 ECONOMIC ASPECTS OF DITCHBANK WEED CONTROL — W. B. McHenry, Department of Botany, U. C. Davis

10:45-11:05 GENERAL AND TECHNICAL ASPECTS OF WEED CONTROL, IMPERIAL IRRIGATION DISTRICT — Oscar Fudge, Imperial Irrigation District, El Centro

11:05-11:30 WEED CONTROL IN TURF — Norman Goetzke, Oregon State College, Corvallis, Oregon

11:30-12:45 Luncheon

12:45- 1:45 WHAT'S NEW IN PESTICIDES LITIGATION? — Stuart Turner, Consulting Agrologist, San Francisco

JANUARY 5, 1967—AFTERNOON

NON-CROPLAND WEED CONTROL
F. R. Ogilvy, U. S. Borax and Chemical Corp., Los Angeles

(*Continued on next page*)

2:00- 2:30 RAILROAD ELECTRIC WEED SPRAY CAR — D. W. Yazell, Engineer of Vegetation Control, Santa Fe R. R.

2:30- 3:00 WEED CONTROL UNDER ASPHALT PAVING — Carl F. Lind, District Engineer, The Asphalt Institute

3:00- 3:20 Coffee Break

3:20- 3:50 WEED AND BRUSH CONTROL UNDER TRANSMISSION LINES — Elmer Lee, Manager, Line Clearing Dept., Southern California Edison Company

3:50- 4:20 WHY IS THE NAVY CONCERNED WITH WEED CONTROL? — Mike Palermo, Engineering Commission, Eleventh Naval District Headquarters

4:20- 4:50 DISTRIBUTER'S VIEW OF INDUSTRIAL HERBICIDE MARKET — Bob Bruner, Industrial Herbicide Specialist, Van Waters and Rogers, Inc.

JANUARY 25, 1967 — EVENING

8:30- WHAT'S NEW IN WEED CONTROL? — Ed Swift, U. C. Berkeley, Chairman

JANUARY 26, 1967—MORNING

RESEARCH REPORTS
Chairman — Lowell Jordan
U. C. Riverside

9:00- 9:30 PRINCIPLES OF WEED CONTROL RESEARCH — Boysie E. Day, Dept. of Horticultural Science, U. C. Riverside

9:30-10:00 A CONCEPT ON MODE OF ACTION OF HERBICIDES — F. M. Ashton, Dept. of Botany, U. C. Davis

10:00-10:15 Business Meeting

10:15-10:30 Coffee Break

10:30-11:00 HERBICIDES IN THE SOIL — Lowell Jordan, Dept. of Horticultural Science, U. C. Riverside

11:00-11:20 SOIL INCORPORATION AND MANAGEMENT OF HERBICIDES — J. M. LYONS, Dept. of Vegetable Crops, U. C. Riverside

11:20-11:40 MODE OF ACTION OF PHENYL URATHANE HERBICIDES — J. D. J. D. Mann, U. C. Riverside

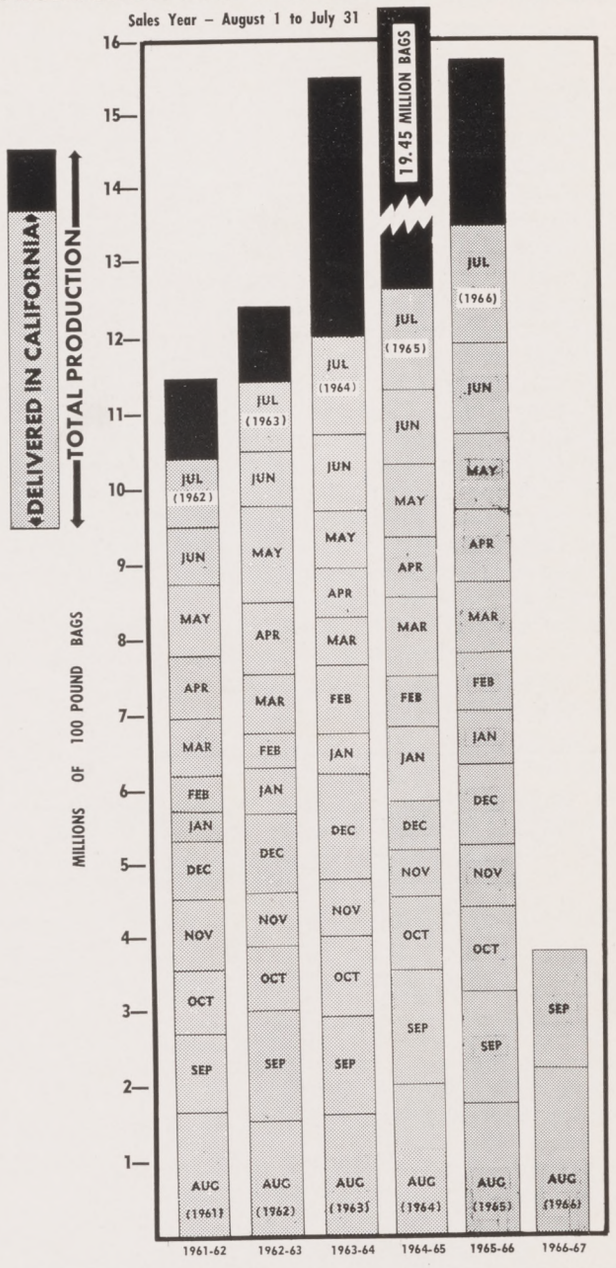
11:40-12:00 PHYSIOLOGY OF SPROUTING ON CHAPARRAL SPECIES — J. R. Goodwin, U. C. Riverside

12:00 Conference Adjourns

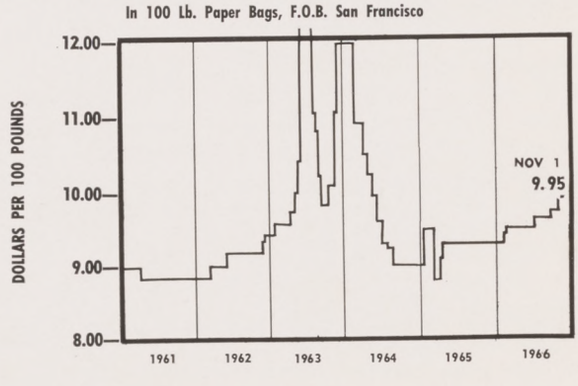
SPRECKELS SUGAR BEET BULLETIN is issued bi-monthly by the Agricultural Department of Spreckels Sugar Company as a service to its growers. Mention of specific methods, devices and implements does not constitute an endorsement by the Company. All photographs by the editor unless otherwise indicated.

AUSTIN ARMER, EDITOR
SPRECKELS SUGAR COMPANY WOODLAND, CALIFORNIA

PRODUCTION AND DELIVERIES OF BEET SUGAR



QUOTED PRICE OF BEET GRANULATED SUGAR



JA 3 '67

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